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POWER AND GAS

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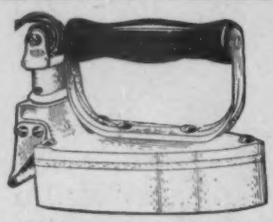

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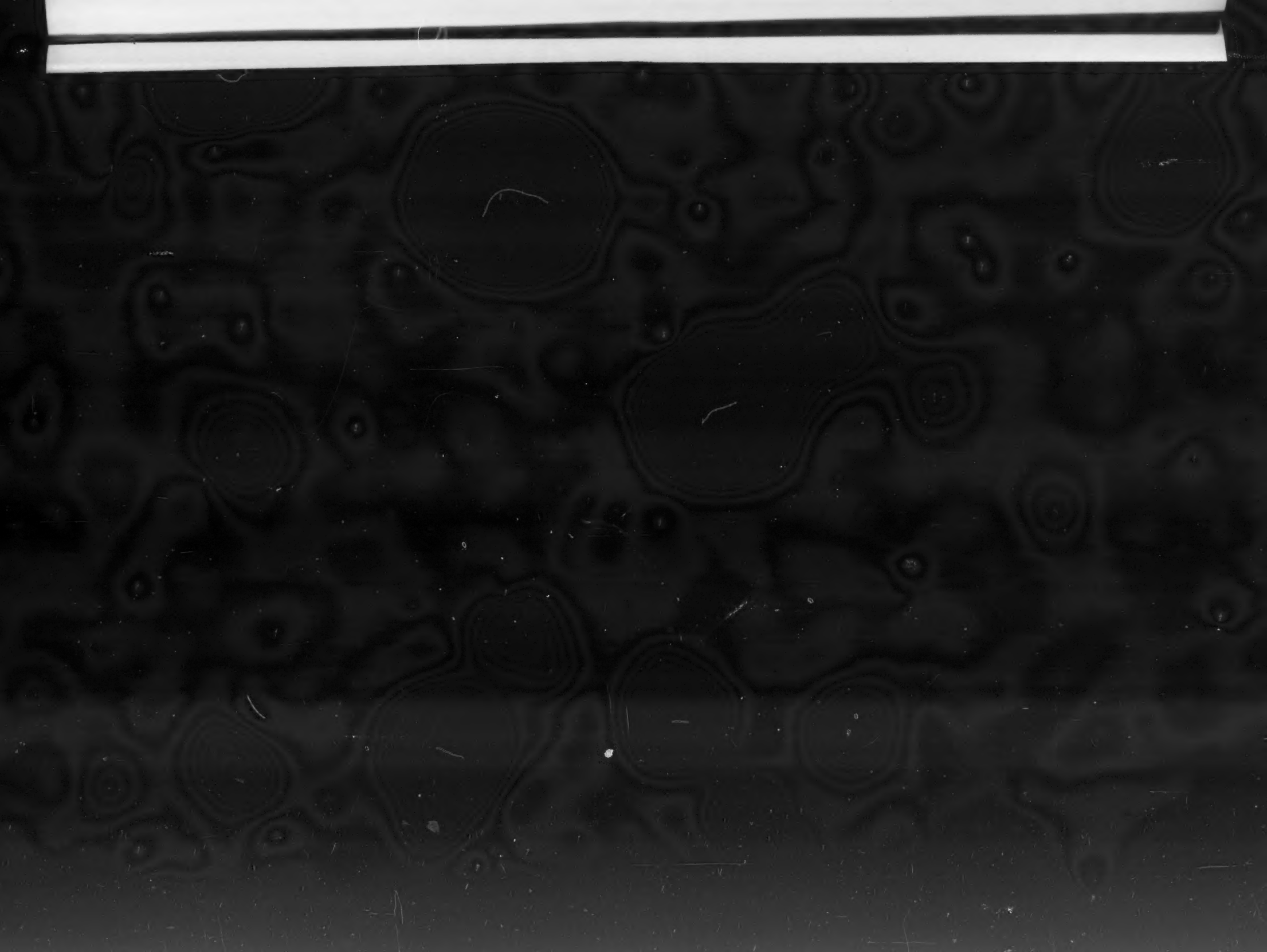

JOURNAL OF ELECTRICITY

POWER AND GAS

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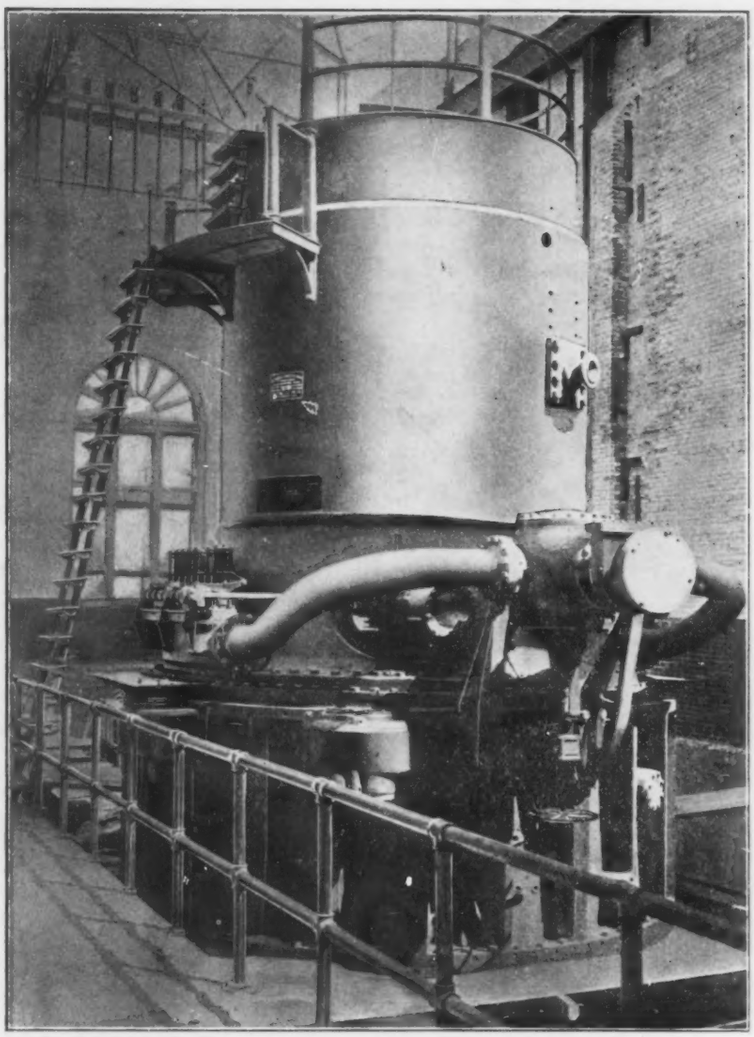
VOLUME XXII. SAN FRANCISCO, JANUARY 23, 1909 NUMBER 4

NEW STEAM PLANT OF THE UNITED RAILROADS OF SAN FRANCISCO

In order to keep pace with the rapid growth of San Francisco since the great fire, and the resultant demand for increased street car service, the United Railroads have found it necessary to make extensive additions to their entire electrical equipment. As the existing steam generating apparatus proved entirely inadequate, although supplemented by all the available power obtainable from both the City Electric Company and the Pacific Gas & Electric Company, a new source of power has recently been provided, in the form of a steam turbine generator set, installed during the past summer in the North Beach power house, and placed in service about November 1st last.



5000 K. W. Curtis Steam Turbine Installed by United Railroads of San Francisco

The North Beach power house was originally designed to contain four engine driven units, and some six years ago the first two of these were installed, each unit consisting of a triple expansion Union Iron Works engine to which were direct connected two General Electric revolving field generators, each generator rated at 1250 k. w., 25 cycles, 13,200 volts, a total of 5000 k. w. for the two units.

The new turbine, installed in the space originally provided for a third engine driven unit, is of the Curtis vertical shaft type, manufactured by the General Electric Company. The generator is rated 4 pole-5000 k. w.-750 r. p. m.-13,000 volts-25 cyles, has the usual overload capacity of 50% for two hours, and is designed for steam at 175 pounds gauge at the throttle and 28 inch vacuum. The turbine has standard exhaust base and separate Wheeler surface condenser, with 20,000 square feet cooling surface. Dry vacuum pumps are provided in duplicate, and are of Wheeler make, size 12" x 26" x 16". A 24-inch Wheeler centrifugal pump, operated by a 440 volt, 25 cycle, 200 h. p. induction motor at 500 r. p. m., furnishes cooling water for the condenser, and a 4-inch Wheeler two stage turbine pump, operated by a 30 h. p. induction motor takes care of the condensed steam from the hotwell. Two 30-gallon duplex Dean pumps, 14" x 3½" x 12" supply oil at 900 lbs. pressure per square inch for the step bearing, and two "Durable" pumps, 5½" x 3¾" x 5" supply oil at 120 lbs. pressure per square inch to the upper and middle guide bearings and to the hydraulic cylinder which actuates the steam valves. The return oil from step bearing, guide bearings and hydraulic cylinder is circulated through a No. 032 Turner oil filter, where it is cleaned and cooled before being used again.

A dead weight accumulator, with a plunger 16 inches

diameter and 12 feet stroke, having a total weight of 96 tons, is connected to the high pressure oil line to supply the step bearing with oil for about five minutes, should the pumps become temporarily inoperative.

The former capacity of the boiler room, which contained eight 500 h. p. Babcock and Wilcox boilers, has been increased by the addition of six 600 h. p. boilers of the same make, making a total of 7600 boiler horse power installed.

An additional turbine unit of 9000 k. w. capacity, with the necessary auxiliaries, will probably be installed in the same power house during the coming summer.

THE SIGNIFICANCE OF DRAFTS IN STEAM BOILER PRACTICE.

A preliminary bulletin on "The Significance of Drafts in Steam-Boiler Practice" is soon to be issued by the Technologic Branch of the United States Geological Survey. The authors of the bulletin, Walter T. Ray and Henry Kreisinger, in carrying out the particular work assigned to them in the general plan for the conservation of the fuel resources of the country have this to say in their bulletin:

"The experiments so far made seem to indicate that it is possible to double or treble the capacity of a plant without making any radical changes in the furnaces and boilers. These increases require about double and treble the quantities of air to be put through the fuel beds and boilers. It also seems probable that rebaffling the boilers will often permit the capacity to be doubled or trebled, while still getting more steam than formerly per pound of coal for uses outside the boiler room.

"These experiments were undertaken with the object of clarifying ideas concerning the passage of air through fuel beds and boilers. Measured weights of air were passed through two beds of lead shot, in series, one of which remained always the same and represented a boiler; the other being varied as to size of shot and depth of bed, and representing a fuel bed. Careful observations were made of the weight of air passing through the beds per minute. All data were plotted in many charts, so as to permit the study of them from several points of view. A number of laws were deduced bearing on the relative amounts of power required to force air through fuel beds of various thicknesses, composed of various sizes of coal, and through boilers of various lengths and areas of gas passages.

"An important part of the discussion relates to an increase in the capacity of boilers by increasing the amounts of power which must be applied to pressure and exhausting fans in order to force several times as much air through the fuel beds and boilers.

"It may be possible, as a result of these investigations, to raise the rate of working the boiler heating surface to three or even four times its present value. Such an increase would undoubtedly mean new designs of grates, stokers, furnaces and boilers, especially fitted for high rates of working. Fan equipments designed to supply three of four times as much air under several times the pressure would be provided with more efficient engines, which is an additional factor favoring high-capacity working.

"It must be borne in mind, as stated above, that the results are tentative. It will cost money to force gases at high speeds through fuel beds and boilers, and there will soon be pressing need of such quantitative data as will enable the largest possible part of the energy imparted by the fans to be advantageously utilized.

"The attempt must not be made to put more air through existing boilers by running the fans a great deal faster, because the power consumed will increase far faster than the above calculations estimate. New fans and engines must usually be installed of sufficiently larger size to supply the larger quantties of air at as high an efficiency, if not higher.

"As has already been suggested, one way of reducing the work required from the fan in the case of doubling the capacity of the boiler is to increase the grate surface, so as to avoid a high increase of pressure drop through the fuel bed, increasing materially only the pressure drop through the boiler proper. A low pressure drop through the fuel bed would also insure better combustion of the fine particles of coal which would be carried out of the stack unburned if high gas velocities through the fuel bed were employed, the high velocities being obtained by high pressure drops. This last method is being successfully used by H. G. Stott and W. S. Findley, of the Interborough Rapid Transit Company, New York City. They have recently installed an extra Roney stoker under the rear end of each of several Babcock & Wilcox boilers, with the result that the amount of steam produced was nearly doubled, the combined efficiency of the boiler and furnace dropping only about 3 per cent. A complete description of the outfits and the results is given in a paper read by Walter S. Findley, Jr., before the American Institute of Electrical Engineers in December, 1907. In this case the pressure drop through the fuel bed was the same as with the single stoker, or perhaps decreased slightly. Of course, the pressure drop through the boiler proper increased considerably. An electrical engineer would say that the above experimenters put two fuel beds in parallel and with the same potential drop obtained twice the current (weight of gases). The same result could have been obtained by thickening somewhat the fuel bed on the single stoker and increasing the pressure drop through it, in which case the electrical engineer would say that the experimenters put two fuel beds in series and by increasing the drop of potential obtained twice the current (twice the weight of gases). The method of increasing the grate area is a promising one because it requires less work from the fans; it is especially to be preferred in those cases where there is a high pressure of slack in the coal, as already explained.

"The figures and principles derived from the experiments and tests presented in this bulletin may not be applicable directly to special problems; they suggest methods by which each problem can be studied and its successful solution brought about. Further experiments with laboratory apparatus as well as with hot fuel beds are desirable before more accurate figures can be given. The Geological Survey contemplates the making of such experiments in the near future, the results to be worked up and published in the next bulletin on 'Drafts.'"

Canadian use of Niagara's power was recently discussed by Hon. Adam Beck, minister of power in the Ontario cabinet. In addition to paying the actual cost of $9 or $9.40 a horsepower at the falls, municipalities will be required to pay operating expenses, besides 4 per cent of the actual cost of construction transmission lines, and a sinking fund sufficient to wipe out the cost of construction in thirty years, each muncipality being assessed its share. The rates to be charged by the city after purchasing power from the government commission are subject to regulation by the commission. The municipality can not sell for less than cost, and it is thus prevented from bonusing industries by offering free power, while a protest from any rate payer who believes the rate is too high will be sufficient to insure an arbitration by the commission. Work on the western extension of the transmission line can be carried on while the building of the line already contracted for is under way. The Ontario Power Company is planning to increase its output by 65,000 horsepower, at a cost of $800,000, in order to supply power to fourteen municipalities in the province of Ontario. Under the terms of its charter the Ontario Power Company may develop 180,000 horsepower. At the present time it is developing 75,000 horsepower. When the contemplated additions are completed the plant will be in position to deliver 140,000 horsepower. By the ruling of the War Department the Ontario Power Company may export to the United State 60,000 horsepower, while at the present time but 30,000 is being exported.

TRANSFORMER TESTING[1]

(Concluded from January 16)

Ratio and Polarity Tests.

Before a transformer is put into service it is well to make sure that the ratio and connections are correct. The ratio should be absolutely correct, otherwise the delivered voltage will be either too high or too low, causing short lamp life or low candle power. Correct ratios are always essential in multiple connection of transformers, otherwise cross currents will exist, causing undue heating, and eventually the burning out of some of the transformers.

To take the ratio test (see Fig. 6), see that the small switch P, controlling the lamp, is open; then close the secondary switch R, first to S then to S'. If the standard transformer is even then the two voltages read will be the same.

The correct polarity of a transformer is also another condition which must be taken into consideration when connecting two or more transformers in parallel. In speaking of transformers having the same polarity is meant that the instantaneous direction of currents in the leads joined must be the same.

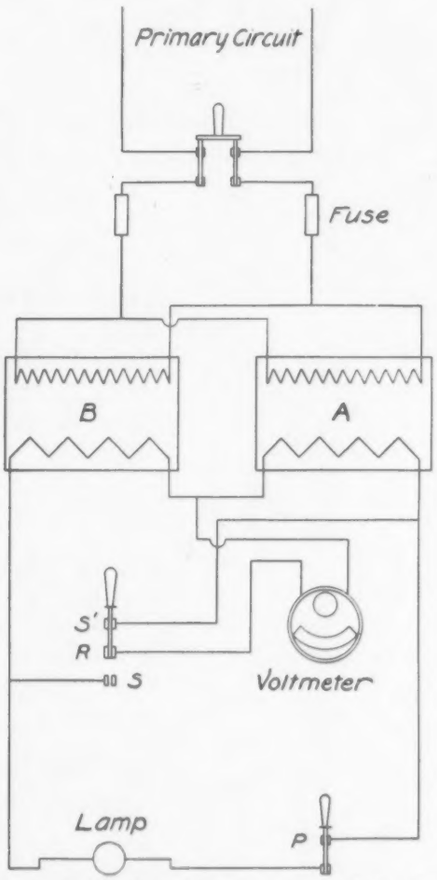


Fig. 6—Connections for Ratio and Polarity Test.

A transformer whose exact ratio and polarity are known should be available in making the following tests. Referring to Fig. 6, A is the transformer under test, and B a transformer of standard ratio and polarity. The secondaries of the two transformers are connected in series and to their common connection, one terminal of the voltmeter is connected, the other voltmeter terminal being connected to the central point of the single pole double throw switch. One or more incandescent lamps in series, whose combined voltage is equal to the total voltage of the two transformers are connected across the secondary leads of the transformers to determine the polarity.

To take the polarity test, see that the secondary switch R is open, and that the small switch P is closed, putting the lamps in circuit, then close main switch, and if the lamp or lamps light up, the polarities of the two transformers are the same.

If no standard transformer is to be had, another easy method of taking ratio and polarity tests is as follows:

Ratio can be determined by simultaneous readings of the primary and secondary voltage of transformer under test at no load. To read the primary voltage, a potential or standard transformer of 10 to 1 or 20 to 1 ratio must be used to step down the voltage to get within the range of a standard voltmeter. To get an accurate determination of ratio this test can be made only with carefully calibrated instruments.

Polarity—Referring to Fig. 7, the leads of the transformer are brought out so that when B and D are connected together a continuous winding is formed from A to C including all primary and secondary coils.

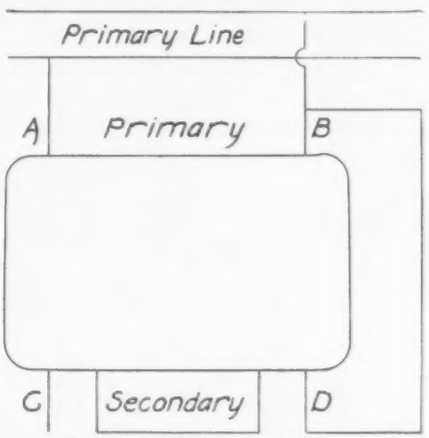


Fig. 7—Connections for Polarity Test.

Therefore, if a given voltage is impressed at AB, the voltage at AC will be greater than the impressed voltage if leads are brought out properly, and less than the impressed voltage if improperly brought out.

Another method of testing polarity where three-phase current is available is as follows: Assuming that the high voltage three-phase supply is available, the primaries of the three transformers will be connected up in delta on these three phases. The secondaries will be connected up in delta with a voltmeter, capable of withstanding twice the secondary voltage of one transformer, inserted in one of the connections across the voltmeter will be zero. If the polarity of any one of the three transformers differs from the other two, then the potential difference across the voltmeter terminals will be twice the voltage of one transformer. This connection is shown in Fig. 8

If the low voltage three-phase current only is available then the secondaries should be connected in closed delta on the three-phase circuit, and the primary connected up in delta with one leg open circuited, and insert in this one circuit an auxiliary transformer to step down to suitable voltage for the voltmeter, as in the event of one transformer being of the wrong polarity the voltage will then be twice the primary voltage, and it is necessary to protect the voltmeter against a burnout, and this would be done by using a step down transformer of known ratio and connecting the voltmeter to the low voltage side of the auxilliary step down transformer.

[1] From "A Practical Guide for Transformer Testing," issued by Fort Wayne Electric Works.

Heat Test.

The temperature at which a transformer operates is the factor which limits the output, life and efficiency. High operating temperature causes deterioration of insulation, increased core loss due to aging of iron, and increased copper loss due to increased resistance of copper.

The A. I. E. E. recommends the temperature rise of transformers for continuous service shall not exceed 50° centigrade in electric circuits by resistance, all other parts by thermometer.

To obtain the temperature rise the transformer is operated with full load current of proper frequency until the temperature shall have become constant.

There are two general methods of obtaining full load current.

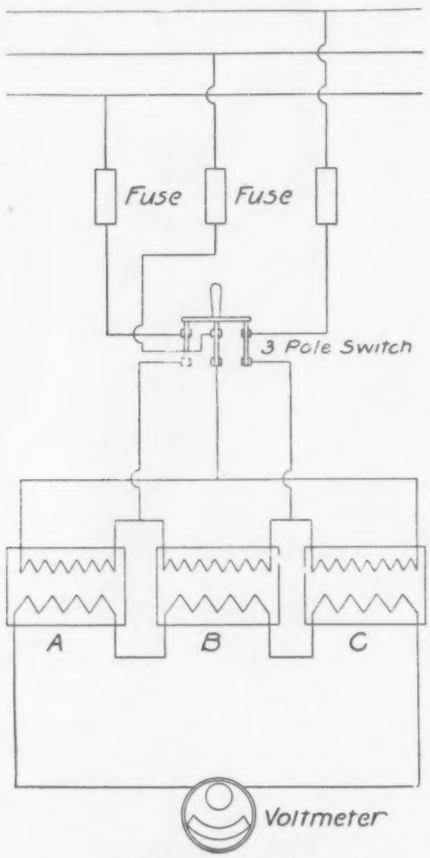


Fig. 8—Connections for Polarity Test.

First Method.

The transformer may be connected to a circuit of proper voltage and frequency and full load current obtained by loading the secondary with lamps or other resistance.

The energy in K. W. hours required for this method equals K. W. capacity of transformer multiplied by time of test in hours. As the energy required for a transformer of 3 to 5 K. W. capacity or over would be very large, this method is not used except with transformers of the smallest sizes.

Second Method.

This method is known as the "loading back" or "opposition" method. The advantage of this method is that no energy except that to supply the copper and core losses is necessary. Therefore, this method may be used with transformers of large K. W. capacity with very little energy consumption.

Two transformers having the same voltage and ratio and as near the same K. W. capacity as possible are required for this test. The secondaries are connected in parallel (Fig. 9), and excited from a circuit of proper voltage and frequency, thereby inducing normal voltage in each primary. The two primaries are connected in series, but in opposition, thus making their combined voltage zero.

As each transformer is, in effect, short circuited by the other, it follows that approximately the sum of their impedance voltages applied across the primaries will impress full-load current in both primary and secondary windings.

This impressed voltage may be obtained from a small auxilliary transformer having a lamp bank or other suitable resistance in series with the secondary, by which the voltage may be adjusted until full load current flows in both windings.

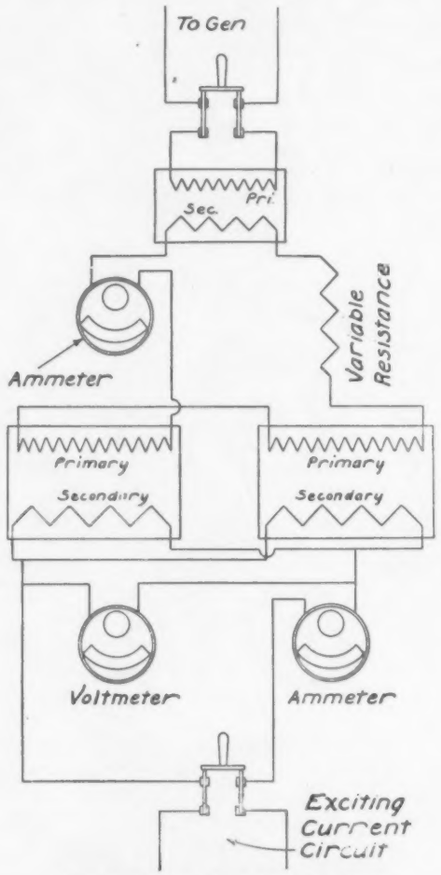


Fig. 9—Connections for Heat Test Loading Back or Opposition Method.

Before commencing this test the transformer should be filled with oil and left in room in which test is to be made long enough to attain same temperature as room.

Three accurate thermometers are necessary for this test. One to be suspended in room, one in oil in transformer case, and one with bulb secured to and in contact with outside of transformer case by putty, waste or string. Record temperatures as shown by thermometers and measure resistance of primary and secondary, same as under "copper loss"

Record thermometer readings every half hour and resistance of primary and secondary alternately every half hour.

Primary and secondary temperature rise must be figured from their respective readings.

The temperature rise of winding may be determined by the following formula:

$$\frac{\text{Res. Hot—Res. Cold}}{\text{Res. Cold}} \times 250 = \text{Temperature rise in degrees C.}$$

The core loss, exciting current, and copper loss

should be taken before and after the heat run. The core loss and exciting current should be less at the end of the run than at the start; if this is not the case, the transformer is either not well insulated or it is not thoroughly dried out.

If the core loss increases instead of decreases at the end of the run it would be well to measure the insulation resistance to determine the condition of the insulation.

The insulation resistance of a well insulated and thoroughly baked out transformer should not be less than one megohm from primary to secondary or from primary or secondary to ground.

Fig. 10 shows the method of taking insulation resistance The supply voltage may be any voltage from 110 to 550 volts direct current, and voltmeter should have sufficient range to measure supply voltage.

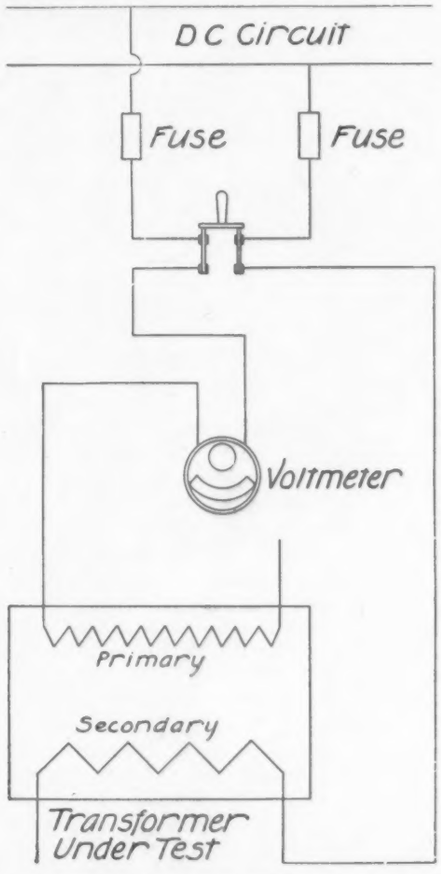


Fig. 10—Connections for Insulation Resistance Test.

Insulation resistance=Total line voltage less the voltmeter reading between winding and ground, or between primary and secondary multiplied by the resistance of the voltmeter and this result divided by the voltmeter reading between winding and ground or between primary and secondary, will give the insulation resistance in ohms.

The copper loss will be greater due to the increased resistance at the high temperature.

Regulation.

The regulation of a transformer is the percent increase of the secondary terminal voltage as the load is decreased from full load to no load.

This test should be made by observing the voltage at the secondary terminals of the transformer, at full load and no load, the primary voltage and frequency being held constant at all times.

The regulation expressed in percent will be the difference between the full load and no load readings, divided by the rated secondary full load voltage of the transformer.

This method of taking test is not satisfactory, due to the very small increase in secondary voltage from full load to no load, and in most cases a central station has no means of loadng the larger sizes of transformers.

The regulation of a transformer may be obtained accurately and reliably by calculation, as given in the following method:

Non-inductive Load: Total IR=Resistance drop of primary and secondary expressed in percent of rated voltage.

$$\text{Impedance percent} = \frac{\text{Rated voltage of transformer}}{\text{Impedance Volts}}$$

$$\text{Reactive drop} = \left\{ \begin{array}{l} \text{The square root of the difference} \\ \text{of the squares of the impedance} \\ \text{percent and total IR percent.} \end{array} \right.$$

$$\text{Exciting current \%} = \frac{\text{Exciting current (amps.)}}{\text{Rated full load (amps.)}}$$

Magnetizing Current %=75%of Ex. Current in percent.

Then the regulation of a transformer for non-inductive load may be expressed thus:

100+Total IR percent + (% Mag. Cur. x % React. Drop) + Quadrature drop (See table).

Inductive Load

With a power factor of 80 percent, the wattless factor of the load becomes 60 per cent, and to this is added the percent magnetizing current (which in most cases might be neglected on inductive load.)

The quadrature drop in this case=(80 percent x Reactive drop percent.)—[Wattless factor (which is 60% plus magnetizing current percent), x total I R percent)] which is taken from table and in most cases may be neglected.

Hence the regulation for inductive load, 80 percent power becomes

100 + (Total I R percent x 80 percent + [Reactive drop x (60 percent + the magnetizing current percent)] +Quadrature drop percent.

Quadrature Drop	Increase in Second Voltage	Quadrature Drop	Increase in Second Voltage
Per Cent.	Per Cent.	Per Cent.	Per Cent.
2.5	.025	6.5	.21
3.0	.04	7.0	.24
3.5	.06	7.5	.27
4.0	.08	8.0	.31
4.5	.10	8.5	.35
5.0	.13	9.0	.39
5.5	.15	9.5	.45
6.0	.18	10.0	.50

Efficiency.

The efficiency of a transformer is the ratio of its net power output to its gross input, the current being measured with non-inductive load. The power input includes the output plus the core loss and the I^2R loss of both primary and secondary windings at a given load on the transformer.

The copper loss by wattmeter may be used instead of the I^2R loss in calculating the efficiency.

The total losses of a transformer are made up of a constant loss or the core loss, and a loss varying as the square of the current, or the copper loss.

For example, we will take a 5 K. W., 60 cycle, 1100/2200 volts primary, 110/220 volts secondary Type A Oil Transformer.

Primary—2200 volt connection.....= 2.27 amp.
Secondary—22 volt connection.....= 22.7 amp.
Resistance of primary .....= 8. ohms
Resistance of secondary ..... .09 ohms

Losses—Full Load.

Primary I^2R	41.3	watts
Secondary I^2R	46.4	"
Total I^2R	87.7	"
Core loss which is constant	48.	"
Total loss	135.7	"
Output at full load	5000.	"
Input at full load	5135.7	"

$$\text{Efficiency} = 100\% - \frac{135.7}{5135.7} = 97.35\%$$

Losses—Half Load.

Total I^2R=(¼ of full load I^2R)	= 21.9	watts
Core loss	48.	"
Total loss	69.9	"
Output	2500.	"
Input	2569.9	"

$$\text{Efficiency} = 100\% - \frac{69.9}{2569.9} = 97.35\%$$

All Day Efficiency.

The all day efficiency of a transformer is the ratio of the output to the input during 24 hours. Taking the same transformer as above, with

Full load for two hours
Half load for two hours
Quarter load for two hours.
One-tenth load for eighteen hours,

the all day efficiency would be as follows:

Load	Watt-hours	I^2R Loss
Full	10,000	174.5
½	5,000	43.8
¼	2,500	11.
1-10	9,000	15.8
	26,500	245.1

Core loss for 24 hours, 48 x 24=1,152 watts.

Total losses for 24 hours=1,152 watts plus 245=1,397 watts.

Total output for 24 hours=26,500 watts.

Total input for 24 hours=27,897 watts.

$$\text{All day efficiency} = 100\% - \frac{1,397}{27,897} = 95\%$$

Oil for Transformers.

The oil used in transformers performs two important functions: It serves to insulate the various coils from each other and from the core, and it conducts the heat from the coils core to some cooler surface, namely, the transformer case, where it is dissipated in the surrounding air.

It is evident that the oil should be free from any conducting material. It should be sufficiently thin to circulate rapidly when subjected to difference of temperatures at different places, and it should not be ignitable until its temperature is raised to a very high value.

A good grade of transformer oil should show very little evaporation at 100°C, and it should not give off gases at such a rate as to produce an explosive mixture with the surrounding air at a temperature below 180°C. It should not contain moisture, acid, alkali or sulphur compounds.

It has been shown that the deteriorating effect of moisture on the insulating qualities of an oil is very marked; moisture to the extent of .06 percent reduces the dielectric strength of the oil to about 50 percent of the value when it is free from moisture, but there is very little further decrease in the dielectric strength with an increase in the amount of moisture. Dry oil will withstand a break-down test of 25,000 volts between two .5 inch knobs separated by 0.15 inch. The presence of moisture can be detected by thrusting a red hot nail in the oil; if the oil "crackles" water is present.

THE MANUFACTURE OF INCANDESCENT LAMPS.[1]

By F. S. Mills.

In an incandescent lamp the essential parts are the bulb, stem, filament, joint, platinum leading-in wires, copper-leading-in wires, and base. When the incandescent lamp was first manufactured the filament was made from metals, thread and bamboo. Metals proved too expensive and the temperature at which they softened and became weak was too low. The thread was the most successful, although the artificial filament now in use is far better than any other used.

A thread filament must be strong enough to withstand the mechanical handling and shipping, must be a partial conductor and must offer resistance to the passage of current; in order that it may glow and emit light it must be sufficiently durable to withstand incandescence and not disinteregrate too rapidly. These requirements are met by combining vegetable matter with an acid, the usual method being to dissolve absorbent cotton in a solution of chloride of zinc. This combination of absorbent cotton and chloride of zinc solution is put in a compartment so as to maintain a constant temperature and while in this state has the appearance of dark molasses. It is then poured into stout glass bottles and squirted through a die by means of air pressure which forces it out as a white sticky thread. During this operation the die is immersed in alcohol contained in a jar mounted on a slowly revolvng base so that the thread does not come in contact with the atmosphere. The alcohol hardens and bleaches the thread.

The shrinkage during the manufacture of filaments is considerable. The diameter of the filament upon leaving the die is 22/1000 of an inch but it soon shrinks to 5/1000 of an inch. The filament after leaving the jar and being dried, is wound on large drums where it is roughly sorted according to size and shape, such as an oval coil, double coil, spiral or hairpin, as the case may be. While wound on these forming drums it is placed in an oven and heated to a moderate temperature. In order to set the filament in shape after this process the filament is cut off the forms and packed in boxes surrounded by carbonaceous material. The box or crucibles are placed in furnaces air-tight, having burners in the center. This is heated to a preliminary heat at a low temperature and to a final heat at a high temperature, lasting for some hours. This process changes the delicate white thread to a hard, stiff, and brittle carbon. The peculiarity in which carbon differs from other material when used as a conductor is that it is negative, and as it increases in heat the resistance decreases. In other words a carbon filament has one-half the resistance when hot as when cold. In metal conductors the resistance increases as the temperature increases, it being positive.

The glass used in a lamp will stand a high temperature without changing its quality. It must be very clear so that no light may be lost in transmission through it, and capable of being worked into different shapes.

The bulb or glass furnished by the glass factory has no tip on the end but has a neck below the shoulder about three inches long. The bulb is cleaned thoroughly before using and then tubulated, that is a small glass tube is affixed to the end of the bulb which in turn is used to connect a pump to exhaust the air. After exhausting, this tube is cut off and what is known as the tip of the lamp left. The next step is to mount the filament on the finished stem, paste being used to join the filament to the platinum leading in wires in the stem. Sealing is accomplished by heat, which operation is performed by melting down the neck of the bulb over the flare of the stem, making a complete glass envelope.

[1]Extract from paper read at Sales Conference of the San Francisco office of H. W. Johns-Manville Company.

The lamp is exhausted by placing a compound in the small tube which has heretofore been attached to the bulb and then heating. The gases of the chemical unite with the gases given off by the filament and joints of the lamp, forming an inert gas which is rapidly drawn out by a mechanical pump. After the lamp is taken off the pump, the next step is to decide at what voltage the lamp will give 16 c. p., at 3½ watts, providing they are manufacturing this type of lamp. About 80% of the results will run from 108 to 112 volts, the remainder running outside, some being as low as 104 volts, and as high as 116 volts. You can then see what advantage the large manufacturer has over the small one, as he is able to stand that loss in the manufacture.

To test the candle power of a lamp in terms of a unit is the next step, the British Parliamentary standard candle being used. For instance if a pencil be held upright on a piece of white paper and a 16 c. p. lamp be held at a given distance, the pencil will throw a shadow of a certain density. If an 8 c. p. lamp were placed at the same distance the density would be much less, this roughly is the photometric principle of testing a lamp for candle power.

A standard lamp is decided upon and placed at a given point, then a lamp to be tested is placed at an opposite position on the scale so as to throw a shadow opposing a standard lamp. When the shades are equalized a reading is made on the voltmeter and the voltage of the lamp decided upon.

The test lamp used is checked frequently with twenty to thirty other standard lamps and if found to be off is replaced by another standard lamp. The definition of the British Parliamentary standard candle is a candle 8/10 inch in diameter at the top and 9-10 inch at the base, weighing 1,200 grams avoirdupois, which is about 6 to the pound, and burning at the rate of 120 grams per hour. The German standard candle is about 88% of the English unit, in other words a 16 c. p. lamp made in Germany would be about 14.1 c. p. of our standard.

The range of candle power now guaranteed for a 16 c. p. lamp is from 14.8 to 17.2 c. p. The effects of voltage on the candle power of a lamp is as follows: In the 100 to 125 volt class one volt equals one candle power, in the 50 volt range, one volt equals two candle power, and in the 200 to 250 volt range, one volt equals one-half of one candle power. You can see how the exact voltage and assortment of lamps results in good work for the factory. If the factory is to supply 110 volt lamps they must discard everything below 108.8 and above 111.2 volts, as they are allowed only a variation of 1.2 from the required voltage.

The finishing operations in the manufacturing of a lamp are the sorting, basing, washing and drying, labeling, wrapping and packing. The sorting is more of an inspection after the lamps leave the testing room. Basing is divided into two operations. The first consists in placing suitable cement on the inside of the base, fitting the base to the neck of the lamp, threading the wires and heating the base in order to dry the cement which firmly grips the neck of the lamp. The lead-in wires are then cut off and soldered to the two conducting parts of the base.

In the Edison base which is used now, almost exclusively, one wire is soldered to the small brass cap at the lower end of the base and the other to the outer shell at the top.

The packing of the lamp is the most important part, as the tip of the lamp must be protected. Formerly lamps were packed in barrels in small cartoons but the manufacturers are now placing them in rectangular boxes with cardboard crates to separate the lamps.

In order for a lamp to be perfect the vacuum must be good. A fair test for this is to strike the lamp against the palm of your hand and note the vibration of the filament. At a high vacuum it is almost impossible to hold the lamp so the filament will not vibrate.

The life of an ordinary lamp is expressed in two ways. One is to define it, as the length of time a lamp burns from the time it is started until the filament breaks and the lamp expires or ceases to burn. The effective life has been generally assumed to be the number of hours of burning from the start until the lamp has dropped to 80% of its initial c. p.

The greater the watts per candle power the longer the life of the lamp, that is a 3.5 watt lamp will live nearly twice as long as a 3.1 watt lamp. The drop of candle power of a lamp is caused by two things, one being a disintegration of the filament and the other the gathering of black particles of carbon on the glass coming from the carbonized filaments thus opposing the candles thrown.

A rough rule showing the effect of voltage on the life of a lamp is that a 4% increase of voltage will reduce the lamp one-half the life, and a 4% decrease in voltage will double the life of the lamp. From this rule you can see what effect a badly regulated circuit would have upon the life of a lamp. The following is the approximate life of a carbon lamp:

16 c. p.	3.1 watt	500 hours
16 c. p.	3.5 watt	900 hours
16 c. p.	4. watt	2000 hours

The Linolite lamp and reflector is the result of an endeavor to improve the distribution of light from the standard carbon filament lamp. The illuminant itself consists of a carbon filament placed lengthwise in a glass tube. It is straight, except for a loop in the center which permits the contraction and expansion of the filament or tube. The filament is the same in size and length as used in a 16 c. p., 3.5 watt lamp, resulting in the same consumption of current, the reflector being 2¼ inch in width, easily hidden in a show window or show case where most any other reflector would be large and bulky. The reflector is made of aluminum, polished on the inside and satin finish on the outside, or can be satin finish on both sides. This type of illumination can be used to great advantage for picture, sign, desk lamp, or other special lighting effects as desired, having good results when used for indirect lighting systems.

The Linolite lamp is manufactured along the lines of the O'Brien lamp which was not successful, however, owing to the fact that the filament was not anchored except at each end of the tube. Nor did they allow for the contraction or expansion, and consequently the filament sagged within a short time and burned out quickly.

In reference to the life of the Linolite lamp, I refer to a test made in a store in San Francisco which installed a four foot section in a show case. The life of the first lamp was 555 hours, the second 650 hours, third and fourth lamps were still burning at the end of 650 hours. The test made by the lighting company on the voltage in this store resulted in the voltage reading 121 volts at 2 p. m. and 116 at 6:30 p. m., while the Linolite lamps were for use on a 110 volt circuit. As stated a 4% increase of voltage on the circuit will reduce the life of the lamp 50%. This will prove the life of the Linolite lamp to be greater than 1000 hours according to the above test on life, at the named voltage variation.

All the light in the Linolite system is utilized to illuminate the goods displayed, no light is wasted outside the window and the intensity of illumination becomes so much greater than the general illumination surrounding the window. This is apparent by aking a section of Linolite and holding it in such a position so as to define a shade line across the hand, then withdraw the hand and note how far away from the illuminent the shadow is still visible.

The tungsten lamp is rated, however, in watts consumption and not in candle power. The rate of consumption per candle power is approximately 1¼ watts. Manufacturers of lamps in the United States have been unable to develop a 220 volt tungsten lamp owing to the condition of the filament in its low resistance and weakness.

HIGH TIMBER DAMS IN CALIFORNIA.[1]

E. M. Chandler.

There are within the Sierra Nevada Mountains many monuments to the skill and fortitude of that hardy class of men known as the old California miners. Not the least interesting and daring of these are some of the comparatively high log dams constructed on the mountain streams for the diverting and the storing of water, for use during the long, annual low-flow season, which have been used in furthering the interests of placer mining in the early days, and later for power and milling purposes during the advent of the quartz miners. There are several of these dams upon the South Fork of the Stanislaus River, which are now the property of the Tuolumne Water Power Company, and were formerly owned by the Tuolumne County Water Company, which began to furnish water to the miners in the early 50's.

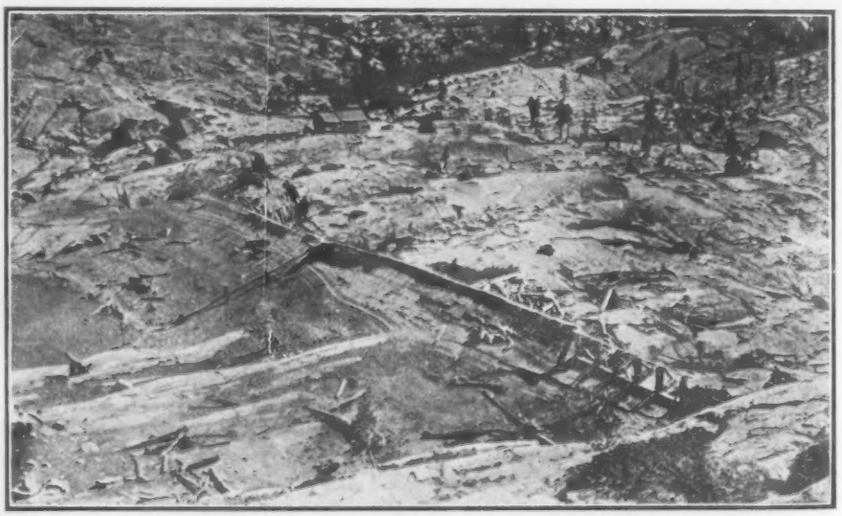
Lyons Dam on South Fork of Stanislaus River.

The largest of these dams, locally known as Big Dam, is located in a very rugged granite canyon, at an elevation of about 7,300 feet, and when first constructed in 1856 had a maximum height of 62 feet and a length approximately 450 feet. The catchment area above amounts to only 18 square miles, and the estimated capacity of the reservoir is said to have been about 4,000 acre-feet. About twenty years afterward, when, on account of the decline of placer mining, the demands upon the stored waters were not so great, and on account of the rotting of portions of the timber exposed to the air, the height was cut down to a maximum of about 44 feet, which is as shown in the accompanying photograph. The length of the present dam is 385 feet, and the capacity of the reservoir thus formed amounts to about 2,000 acre-feet. The type of construction used is one of a general class which will be described subsequently.

Another dam of interest called Lyon's Dam, is located on this same stream at a short distance above the point of diversion of the main ditch of the Tuolumne Water Power Company. This dam was constructed in 1897 under the direction of Mr. C. E. Grunsky, being built at a cost of about $20,000, having a maximum height of 55 feet and an extreme length along the crest of about 210 feet. The down-stream slope is nearly vertical, and the up-stream side has a slope of 2½ to 1 feet. There are two lengths of cedar logs laid, as shown on the accompanying sketch, with the butt ends pointing down-stream. The joint between the ends of the top layer of logs at the up-stream end, and the solid granite foundation, has been made with the aid of concrete.

The larger logs were laid in layers 8 feet apart, while the smaller ones have an interval of only 4 feet, and the "risers," or the logs lying parallel to the axis of the structure, have an interval varying from 4 to 8 feet. The function of this log crib-work is, of course, to support an almost waterproof timber apron, consisting of two 4-inch layers of planking covering the entire up-stream slope, which is embedded in concrete at its intersection with the foundation.

The leakage through this apron has been inconsiderable, but it is considered an advantage to have a small amount of water trickling through the log crib-work to delay or prevent rotting. This structure has been erected contrary to two general rules relating to the design of timber dams, namely, (1) to have a flat slope or stepped cross-section on the down-stream side unless the height is insignificant, and (2) to have the entire interior timbers sealed from the access of air, since it is believed that the odors which would arse from the damp timbers tend to promote decay. Observations made by the writer seem to indicate that, although the fall and volume of the waste water are considerable, no serious wearing away of the granite at the lower toe of the structure has occurred, and although it is true that the logs are open very largely to the air, the examples of other dams built

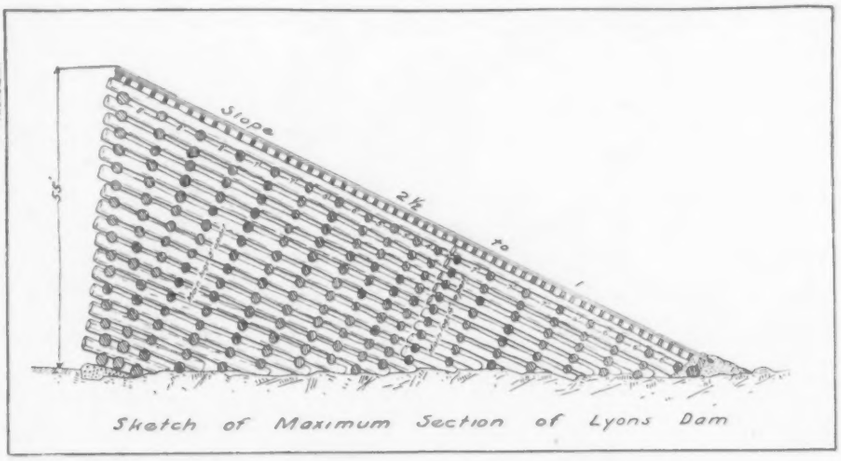


Big Dam on South Fork of Stanislaus River.

[1] Reprinted from California Journal of Technology, to whom we also are indebted for the illustrations.

along the same lines and under the same climatic conditions have shown a remarkable life for timber structures.

The flood waters of the stream are passed over the crest by means of a spillway 131.5 feet long, thus taking up the greater length parallel to the axis. The remainder of the crest consists of two rock-filled cribs, one at either end, to give mass to the structure and to take up the shocks which might arise from floating trees and ice during times of flood. It is apparent from the accompanying photograph that the spillway is not level, but this is due to a settling near the left bank shortly after construction, which has caused no serious trouble. The dam successfully withstood the flood of March, 1907, in which it is estimated that about 4,500 second-feet passed over the crest, representing the run-off from a draining basin of 70 square miles equivalent to a water yield of 64.3 second-feet per square mile of catchment area.



Sketch of Maximum Section of Lyons Dam

PRESIDENT VETOES DAM BILL.

President Roosevelt sent to the House on January 15 a message vetoing a bill for the construction of a dam across James River, Missouri, by William H. Standish, declaring the measure did not contain the conditions essential to protect the public interest. The President referred to the control of water power sites and said that more than 33 per cent of the total water power now in use probably was controlled by thirteen concerns.

Following is the message in part:

"The House of Representatives: I return herewith without my approval house bill 177707, to authorize William H. Standish to construct a dam across James River, in Stone County, Missouri, and divert a portion of its waters through a tunnel into the said river again to create electric power. My reasons for not signing the bill are:

"The bill gives to the grantee a valuable privilege which by its very nature is monopolistic and does not contain the conditions essential to protect the public interest."

President Roosevelt quotes from a letter he wrote on March 13, 1908, to the Senate Committee on Commerce in pursuance of a policy declared in his message of February 26, 1908. In this letter the President says:

"Through lack of foresight we have formed the habit of granting without compensation extremely valuable rights, amounting to monopolies, on navigable streams and on the public domain.

"The repurchase at great expense of water rights, thus carelessly given away without return, has already begun in the East, and before long will be neecssary in the West also.

"No rights involving water power should be granted to any corporation in perpetuation, but only for a length of time sufficient to allow them to conduct their business profitably.

"A reasonable charge should, of course, be made for valuable rights and privileges which they obtain from the National Government. The values for which this charge is made will ultimately, through the natural growth and orderly development of our population and industries, reach enormous amounts.

"A fair share of the increase should be safeguarded for the benefit of the people from whose labor it springs. The proceeds thus secured, after the cost of administration and improvement has been met, should naturally be devoted to the development of our interest and waterways.

"Accordingly I have decided to sign no bills hereafter which do not provide specifically for the right to fix and make a charge and for a definite limitation in time of the right conferred."

An amendment to the present bill expressly authorizing the government to fix a limitation of time and impose a charge was proposed by the War Department, but turned down by the Senate Committee on Commerce on the ground that it was "a new departure" and not authorized by the power of the Federal government. After arguing in behalf of the legality of such limitations the President continues:

"Believing that the National government has this power I am convinced that its power ought to be exercised.

"The people of the country are threatened by a monopoly far more powerful, because in far closer touch with the domestic and industrial life than anything known to our experience.

"A single generation will see the exhaustion of our natural resources of oil and gas and such a rise in the price of coal as will make the price of electricity transmitted water power a controlling factor in transportation, in manufacturing and in household lighting and heating."

Information collected by the Bureau of Corporations, says the President, shows that certain large concerns, of which the General Electric Company and the Westinghouse Electric and Manufacturing Company are now the most important, now hold water power installations and advantageous power sites aggregating almost 1,046,000 horsepower, of which the control by these concerns is practically admitted. This is a quantity equal to over 19 per cent of the total now in use.

Further evidence, he says, makes it probable that thirteen concerns directly or indirectly control valuable water power and advantageous power sites equal to more than 33 per cent of the total water power now in use.

"The great corporations are acting with foresight and singleness of purpose and vigor to control the water powers of the country. They pay no attention to state boundaries and are not interested in constitutional law affecting navigable streams except as it affords what has been aptly called a 'twilight zone,' of which they may find a complete refuge from any regulation whatever by the public whether through the National or the State governments.

"They are demanding legislation for unconditional grants in perpetuity of land for reservoirs, conduits, power houses and transmisison lines to replace the existing statutes which authorizes the administrative officers of the government to impose conditions to protect the public when any permit is issued.

"Several bills for that purpose are now pending in both houses. These bills were either drafted by representatives of the power companies or are similar in effect to those thus drafted."

He now suggests another condition, namely, that the license should be forfeited upon proof that the licenses has joined in any conspiracy or unlawful combination in restraint of trade, as is provided for grants of coal lands in Alaska.

"I will sign no bill granting a privilege of this character which does not contain the substance of these conditions. I consider myself bound, as far as exercise of my executive power will allow, to do for the people in prevention of monopoly of their resources if they were in a position to act. Accordingly, I shall insist upon the conditions mentioned above, not only in acts which I sign, but so in passing upon plans for use of water power presented to the executive departments for action.

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday for the paper dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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Our issue of January 30, 1909, will contain a paper, "How Far Can We Go With Automatic Regulation on Our Electric System," read by Mr. J. S. Lighthipe, engineer for the Edison Electric Company, before the Los Angeles Section of the American Institute of Electrical Engineers, together with discussion thereon. Arrangements have been made whereby the papers read before the Los Angeles, Seattle and San Francisco Sections of the Institute will be published in our columns. These papers are not printed in the Transactions of the Institute, and deal largely with purely Western conditions.

Water Havoc

Although the power of water has been harnessed and its course confined, it occasionally breaks its bounds and like a maddened team of runaway horses, demolishes everything in its path. Last week the Pacific Coast was visited by a great storm, rain in the valleys and snow in the mountains. As the barometer went down the thermometer went up and the snow melted rapidly. The run-off became enormous—every little mountain rivulet became a raging torrent, each pouring its debris-laden burden into the cramped channels of the larger streams and thence to the great river valleys where relief was not found until the artificial barriers had been broken down and the land flooded.

Now the storm has abated, the waters are subsiding and we are reckoning the damage done. Fortunately, the loss of life was slight.

In the mountains the electric power companies were the heaviest losers. Reno, Nevada, is in darkness, and the mines at Virginia City, as well as the railroad shops at Sparks, are without power because high water and land-slides have disabled the several power plants recently acquired by F. G. BAUM and associates. The newly started generator of the Great Western Power Company on the Feather River above Oroville, California, was stopped because the oil tanks were emptied by the rising waters and the tracks of the Western Pacific railroad were washed away, so that the supply could not be renewed. Many of the flumes of the Stanislaus Electric Power Company, near Angels Camp, were carried away and the Philbrook valley dam of the Oro Water, Light and Power Company went out, causing a loss of fifty thousand dollars. The flood also carried with it the small dam of the Diamond Match Company and that of the Valley Counties Power Company, a subsidiary of the California Gas and Electric Corporation. The latter suffered but little loss, although some inconvenience was caused by short-circuiting and many of their pole lines are in the flooded valley districts.

It was in the valleys that the greatest damage was done. Railroad bridges and embankments were washed out and tracks flooded. As the wires were also down, communication had to be diverted and all service delayed. It is of interest to note that the bridge of the Northern Electric road has been connected with the main line of the Southern Pacific and will be used for all through trains until the other bridges can be rebuilt. Ranches and towns have been submerged, and a great acreage of reclaimed land devastated. One gold dredger was wrecked and several temporarily incapacitated. It is as yet too soon to estimate the total amount of damage.

It is possible that this disaster will bring about concerted and systematic action for the building of levees to keep the flood waters from the furtile valley lands. Hitherto these have been built without regard to their possible effect on existing barriers and

unless some relief is provided by law it will be impossible to protect many rich sections. For power companies the flood has set a new high watermark and gives warning of the tremendous power of which hydraulic energy is capable when it sweeps aside the puny trammellings of man.

THE NATIONAL CONSERVATION COMMISSION.

The National Conservation Commission, established by President Roosevelt, contains four sections, namely, Waters, Forests, Minerals and Lands, the duties of the Inland Waterways Commission having been merged in the first-mentioned. Mr. Gifford Pinchot, Forester, is chairman of the Commission and Mr. T. R. Shipp secretary. The first work has been to inventory the resources of the country, a stupendous compilation of statistics. This report is to be transmitted by the President to Congress.

It contains some startling statements as to waste of our fuel resources. It is said that there is enough gas to light all the cities in the United States of over one hundred thousand population needlessly escaping from gas and oil wells. The report demonstrates that the existing and known coal fields of the country contain only enough unmined coal to last until the middle of the next century.

The Section of Minerals recommend certain changes in the laws governing the handling of oil wells and oil lands, and they affirm that the use of oil as fuel for locomotives and other engines is an unnecessary waste of this resource.

The fuels, supplying heat, light and power for domestic and industrial purposes, are the most fundamentally essential resources of the Nation. Use of fuels involves their immediate and complete destruction. The use of large quantities of other materials also increases the rate of consumption of the fuels; for, as the Nation has now passed the stage of early development, the use of fuels is increasing much more rapidly, in proportion to increase of population, than in the past. The mining industry of the country furnishes our light, heat and power, and supplies sixty-five per cent of the freight traffic of the country. The annual waste in mining and treating mineral products is more than $300,000,000.

This report will have a large influence on future legislation, particularly with regard to inland waterways and hydraulic power restrictions.

REMOVAL NOTICE.

The Benicia Iron Works have moved their San Francisco office from 848 Monadnock Building to 559 Monadnock Building.

On and after Monday, January 25th, the executive and sales offices of the Pelton Water Wheel Company will be removed to Suite 1099 Monadnock Building, City, where all future communications should be addressed. The drafting room, offices of the Secretary, Mr. David Donzel, and the Purchasing Agent, will remain in the shop, Nineteenth and Harrison streets, San Francisco.

MEETING NOTICE.

American Institute of Electrical Engineers, Los Angeles Section, met at Pacific Electric Grill, Tuesday, January 19, 1909, 6:30 p. m. for an informal dinner and smoker, followed by an interesting entertainment.

The regular meeting of the San Francisco Section of the American Institute of Electrical Engineers was held in the basement of the building occupied by the Pacific Gas and Electric Company, 925 Franklin street, Friday, January 22, 1909, at 8 p. m. Mr. E. L. Sherwood read a paper entitled, "Lighting with Metallic Filament Lamps."

PERSONALS.

F. E. Vickers, engineer with the San Francisco office of the General Electric Co., is making a short trip to Los Angeles.

George R. Murphy, engineer with the San Francisco office of the Electric Storage Battery Company, is in Los Angeles.

A. W. Ballard, manager of the Los Angeles office of the General Electric Co., has been in San Francisco during the past week.

W. J. Davis, Jr., electrical engineer with the San Francisco office of the General Electric Co., has returned from a trip to Schenectady.

F. C. Vaughen, Sales Manager of the Meter Department of the General Electric Company, with headquarters at Schenectady, accompanied by Mrs. Vaughen, has returned East after a pleasant two weeks' outing on the Coast.

P. H. Coolidge, manager of the Pacific Coast interests of the Western Electric Company, left for Chicago and New York on January 20th and while in the East will attend the annual conference of the managers of the various houses of that Company.

E. S. Utley, who has been in charge of the Incandescent Lamp Department of the Western Electric Company, San Francisco, for several years, will leave for New York on February 1st, where he will fill a similar position in the New York office of his company.

Garnett Young, manager of the Telephone and Electric Equipment Company on the Coast, has returned from a trip of several months through the East, during which time he was in conference with all of the manufacturers whose interests they have charge of in this section.

T. E. Burger, with Mrs. Burger, left San Francisco for the East on January 20th, where he will attend the annual conference of managers of the Western Electric Company to be held at Chicago. Mr. Burger occupies the position of Assistant Manager of the Los Angeles house of that company.

P. J. Aaron, manager of the Seattle house of the Western Electric Company, attended the meeting of the Electrical Jobbers' Association at Del Monte and left there to join Mrs. Aaron, who was awaiting him in Los Angeles. They left for the East immediately, where Mr. Aaron will attend the managers' conference of his company.

S. N. McFedries, secretary and treasurer of the J. L. Schureman Company of Chicago, left San Francisco for the Northwest on January 19th. Mr. McFedries, in addition to the business position he occupies, is secretary of the Chicago Electrical Club and was present at the meeting of the San Francisco Electrical Club on January 16th, during which he was called upon for some remarks and gave the local electrical people a talk which included some good advice and profitable information.

TRADE CATALOGUE.

Bulletin No. 4 from the Kelman Eliectric and Manufacturing Co., of Los Angeles, California, illustrates and describes the Kelman High Voltage Oil Switches and Oil Circuit Breakers.

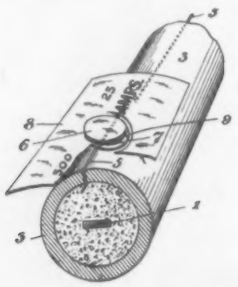
No. 2 of Motor Talks from the Westinghouse Electric and Mfg. Co., is about Display Window Advertising. It is so well written that any possible user or seller of electric power will read it all.

New Departure Manufacturing Co., Bristol, Conn., sent a handsome catalogue illustrating and describing their Two-in-One Ball Bearings that is claimed to be equally efficient in all directions and are particularly adaptable for automobiles.

The Standard Engineering Co., 60 Natoma street, San Francisco, Cal., announce that they are thoroughly equipped for, and will make a specialty of high-class power plant design and construction. R. J. Davis is president, A. St. J. Bowie, vice-president and C. F. Braun, manager.

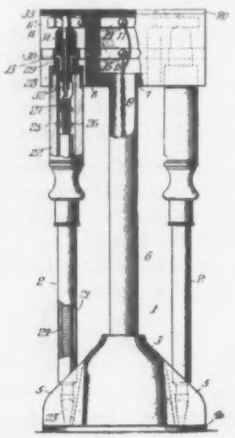
PATENTS

908,646. Indicating Fuse. Robert C. Cole, Hartford, Conn., assignor to The Johns-Pratt Company, Hartford, Conn., a Corporation of Connecticut. Filed Jan. 3, 1907. Serial No. 350,622. 1. An indicating means for inclosed fuses, comprising a dischargeable screen normally overlying and obscuring



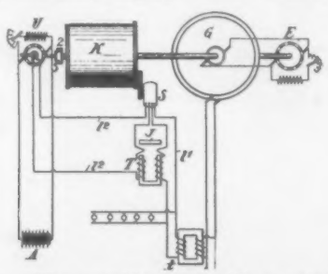
a portion of the fuse inclosure, in combination with an indicator-wire having sufficient gas-producing capcity, upon its electrical disruption, to discharge said screen, and being located upon the fuse inclosure in a position to effect such discharge thereby.

908,712. Electrical Heating Apparatus. Emmet L. Van Dolsen, Berwyn, Ill., assignor to Western Electric Company,



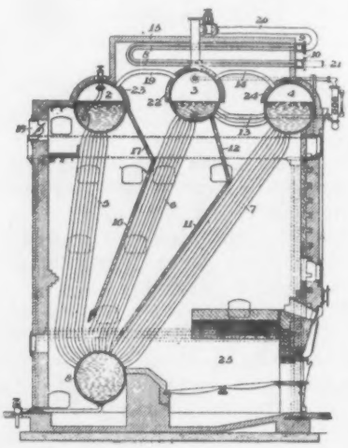
Chicago, Ill., a corporation of Illinois. Filed Feb. 23, 1906. Serial No. 302,494. 5. A supporting device for electric soldering irons comprising a metallic base, having a plurality of pockets therein, a hollow standard rising from said base, an insulating head carried on the top of said standard, and a plurality of sets of contact terminals mounted on said insulating head.

908,474. Method and Device for Electrically Regulating the Speed of Prime Movers, Especially Turbines. Friederich Von Merkl, Vienna, Austria-Hungary. Filed Jan. 31, 1908. Serial



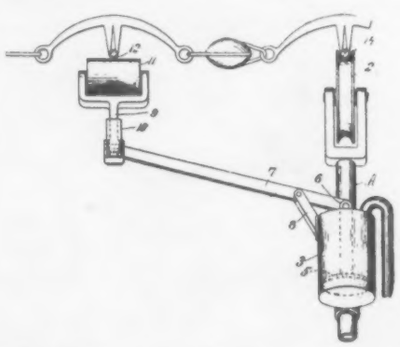
No. 413,680. 1. The combination with a rotating body, the speed of which is to be governed of means for generating an alternating current fixed in phase with relation to said rotating body, a rotating generator for supplying an alternating current variable in phase with relation to said rotating body, speed regulating mechanism for said rotating body, a motor operative by out of phase currents for controlling said regulating mechanism, and means for supplying current in phase with said generator and current in phase with said rotating body respectively to said motor.

908,939. Superheater-Boiler. John E. Bell, New York, N. Y., assignor to The Babcock & Wilcox Company, New York, N. Y., a corporation of New Jersey. Filed June 6, 1906. Serial No. 320,368. Renewed April 4, 1907. Serial No. 366,411. 1. A water tube boiler having transverse steam and water



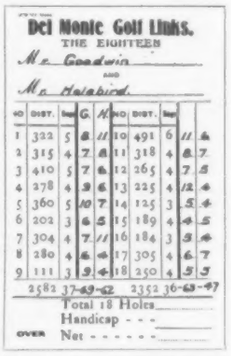
drum connected by banks of tubes to a lower mud drum or drums, a superheater located in the boiler setting over the steam and water drums, and baffling arranged to direct the gases successively over water tubes thence up over the superheater and thence down and over other water tubes of the boiler, substantially as described.

908,981. Trolley-Pole Attachment. Herman W. Eichbaum, Los Angeles, Cal., assignor of one-half to John Beckman, Rhyolite, Nev. Filed March 28, 1908. Serial No. 423,851. 1. The combination with a trolley-pole and a trolley-wire, or a contact member arranged adjacent to the trolley-wire and



having electrical connections with an object to be electrically actuated, a mechanically operated contact member carried by the trolley-pole and having electrical connection through the car with the aforesaid object to be electrically actuated, and fluid pressure means for placing said contacts in the path of one another, whereby the circuit is closed on the passing of the car.

THE BATTLE OF DEL MONTE



Del Monte Golf Links.
THE EIGHTEEN
Mr. Goodwin
AND
Mr. Holabird.

NO.	DIST.	Par	G.	N	NO.	DIST.	Par		
1	322	5	8	11	10	491	6	11	4
2	315	4	7	8	11	318	4	8	7
3	410	5	7	6	12	265	4	7	5
4	278	4	8	6	13	225	4	12	4
5	360	5	10	7	14	125	3	5	4
6	202	3	6	5	15	189	4	4	5
7	304	4	7	11	16	184	3	5	4
8	280	4	6	6	17	305	4	6	7
9	111	3	9	4	18	250	4	5	5
	2582	37	69	62		2352	36	63	47

Total 18 Holes
Handicap - - -
OVER Net - - - - -

THE WINNING SCORE CARD

THE Electrical Jobbers' Association of the Pacific Coast held a meeting at the Hotel Del Monte, Del Monte, California, January 17th and 18th, with a full attendance from Seattle, Los Angeles and San Francisco. A golf tournament, a little dinner and a business meeting were the three principal events.

Sunday, the 17th, was a beautiful day, bright and sunny, and the Del Monte links, famous for their scenic beauty, were in an ideal condition for the match.

Fourteen members were entered, but owing to the failure of Mr. H. V. Carter of Los Angeles to reach the battle field on time, the actual starters numbered thirteen.

In view of the fact that a number of the players had had no previous experience in playing the game, the work of the handicapping committee was largely a matter of guess work which threw an air of uncertainty about the result comparable only to an impenetrable San Francisco fog.

Play started promptly at 10 o'clock in the morning and for three solid hours the contest raged. Clods of earth sailed through the air, balls with various colored dots were lost, some of them forever, hands were blistered and curses suppressed. After it was all over and the smoke cleared away the count showed that W. L. Goodwin of San Francisco was the winner, with A. H. Elliott of Oakland a close second.

The trophy was a handsome cup of burnished copper with silver handles and rim. It will be lettered with the name of the winner, who will hold it for ninety days, after which it goes to the winner of the next tournament.

The following figures give the result in detail:

The Score.

Players	Actual Strokes	Handicap	Net
Coolidge, P. H.	105	Scratch	105
Davis, R. J.	106	+4	110
Carrigan, Andrew	106	+4	110
Holabird, R. D.	109	4	105
Berry, W. S.	120	15	105
Scribner, E. M.	122	10	112
Goodwin, W. L.	132	45	87
Elliott, A. H.	144	54	90
Gilson, C. L.	153	54	99
Woodward, F. H.	159	54	105
Hillis, C. C.	159	54	105
Bibbins, T. E.	160	27	133
Knoche, G. A.	167	54	113

AFTER THE BATTLE. RESTING ON THE STEPS OF THE HOTEL DEL MONTE.

In the afternoon another contest was held, which, however, was without any incentive in the way of a prize in which Mr. Goodwin to prove his claim succeeded in reducing his score and gave promise of golf playing ability of a high order.

Sunday night the jobbers dined in a private room of the hotel, where, seated at the round table, the trophy was transformed into a loving cup for the time being, and, filled to the brim, was passed and repassed while toasts to the winner and remarkable tales of what might have been filled the air.

Mr. H. V. Carter, T. E. Burger, and Arthur Ballard of Los Angeles did not reach Del Monte until Sunday night, while the Seattle party made up of Mr. E. N. Fobes, P. J. Aaron, and W. S. Brown was delayed by the storms in Northern California until Monday. It was unfortunate that circumstances made it impossible for them to be in attendance at the tournament and dinner, but it assured a full attendance at the business meeting which was held on Monday.

Two business sessions were held and at the afternoon meeting the following officers were elected to serve during the ensuing year:

Chairman—Andrew Carrigan, San Francisco.

Secretary—A. H. Elliott, Oakland.

Executive Committee—C. C. Hillis, San Francisco.

The session ended Monday night, the members from the north returning to San Francisco in a private car attached to the Los Angeles flier.

W. L. GOODWIN
Winner of the Del Monte Cup.

The presence of women in the party added greatly to the success of the meeting. Mrs. Andrew Carrigan, Mrs. W. S. Berry, Mrs. G. A. Knoche, Mrs. F. C. Vaughen, and Mrs. T. E. Burger taking a great interest in the field sports particularly.

The next meeting and golf tournament will be held in about ninety days and will be of unuual interest, as handicaps will be based on the Del Monte record, and the new players will undoubtedly find their work cut out for them in their efforts to maintain the records they have established.

Notes of the Game.

From the standpoint of actual strokes, P. H. Coolidge made the record both morning and afternoon. His morning score was 105, which in his afternoon play he cut down to 102.

Andrew Carrigan—"Saint Andrew of the Links"—tried hard to convince the handicapping committee that they had used good judgment in making his handicap "plus 4," but failed.

Fourteen players were originally scheduled to start, but H. V. Carter of Los Angeles failed to arrive and reduced the number to thirteen. It is somewhat of a coincidence that Mr. Carter's handicap was 23.

W. L. Goodwin, winner of the trophy, had R. D. Holabird for a playing partner and won the match with a set of clubs belonging to E. M. Scribner. Proper coaching and good clubs will sometimes accomplish wonders.

Albert H. Elliott, who holds the ping pong record, explains his loss of the match by the fact that he played the first four holes with the wrong end of the club. After this defect in his playing was corrected he made wonderful strides and evolved a system of play that is unbeatable—providing the handicap is large enough.

During the business session Monday afternoon, F. C. Vaughen of the Schenectady office of the General Electric Company and E. M. Scribner played an 18 hole match which Mr. Vaughen won, four down. Mr. Scribner feels that his being beaten was owing entirely to his lack of direction and failure to secure distance.

SUCCESSFUL RESULTS WITH BRIQUETTED COAL.

A bulletin on the comparative tests of run-of-mine and briquetted coal on locomotives and on a torpedo boat will be issued within the next two weeks by the Technologic Branch of the U. S. Geological Survey. The author of the bulletin, W. F. M. Goss, consulting engineer of briquet tests, gives the results of the tests in the following words:

1. The briquets made on the Government's machines have well withstood exposure to the weather and have suffered but little deterioration from handling.

2. In all classes of service involved by the experiments, the use of briquets in the place of natural coal appears to have increased the evaporative efficiency of the boilers tested.

3. The smoke produced has in no test been more dense with the briquets than with coal; on the contrary, in most tests the smoke density is said to have been less when briquets were used.

4. The use of briquets increases the facility with which an even fire over the whole area of the grate may be maintained.

5. In locomotive service the substitution of briquets for coal has resulted in a marked increase in efficiency, in an increase of boiler capacity, and in a decrease in the production of smoke. It has been especally noted that careful firing of briquets at terminals is effective in diminishing the amount of smoke produced.

6. In torpedo-boat service the substitution of briquets for coal improves the evaporative efficiency of the boiler. It does not appear to have affected favorably or otherwise the amount of smoke produced. The briquets used in this series of tests were of a form requiring considerable bunker capacity for their storage, but as the form of the briquet is a detail entirely within control, this objection need not apply to the use of the briquets in actual service.

The binding material in all the briquettes was water-gas pitch. This material was furnished at the briquetting plant of the United States Geological Survey, in St. Louis, at $9 per ton, or 0.45 cents per pound. The least amount of binding material that would make perfect briquets was found to be 5 per cent of the weight of the coal. The cost of the binder in one ton of the 5 per cent briquets was therefore 45 cents.

The results of the tests justify the following conclusions:

(a) The evaporation per pound of fuel is greater for the briquetted Lloydell coal than for the same coal in its natural state. This advantage is maintained at all rates of evaporation.

(b) The capacity of the boiler is considerably increased by the use of briquetted coal.

(c) Briquetting appears to have little effect in reducing the quantity of cinders and sparks; the calorific value of these, however, is not so high in the briquetted as in the natural fuel.

(d) The density of the smoke with the briquetted coal is much less than with the natural coal.

(e) The percentage of binder in the briquet has little influence on smoke density.

(f) The percentage of binder for the range tested appears to have little or no influence on the evaporative efficiency.

(g) The expense of briquetting under the conditions of the experiments adds about $1 per ton to the price of the fuel, an amount which does not seem to be warranted by the resulting increase in evaporative efficiency.

(h) With careful firing, the briquets can be used at terminals with a considerable decrease in smoke.

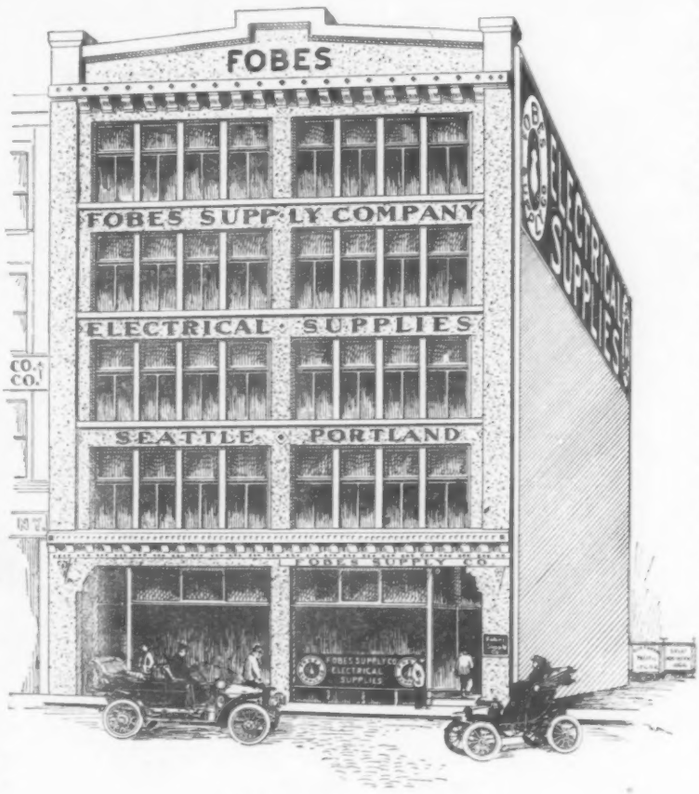
(i) The briquets appear to withstand well exposure to the weather, and suffer little detorioration from handling.

INDUSTRIAL

NEW BUILDING OF THE FOBES SUPPLY COMPANY.

The Fobes Supply Company of Seattle and Portland recently reached the point where they found their business outgrowing their old quarters and being unable to find a satisfactory building in the rapidly growing city of Seattle were compelled to erect a five story structure for their own occupancy.

The Fobes building on First avenue South, Seattle, is one of the best examples of modern concrete and fireproof construction in the city. The building occupies a ground space 45x150 feet, and has been completed to five stories and basement, although designed to be eight stories high when finished. The final area will be 54,000 square feet.



FOBES BUILDING, SEATTLE

The building is as fireproof as it can be made. There is not a piece of wood in its walls, beams or floors. The openings are protected by Kinnear rolling steel doors, also Standard doors; while the windows are of wire glass.

The roof is covered with P. & B. standard roofing; the walls are coated with Pabco damp proof compound and the elevator made water tight with Malthoid and canvas.

The front on First avenue is finished in pebble dash and Moravian tile. This is the only building in Seattle having this combination of finish on solid concrete.

The Fobes Supply Company, dealers in electrical machinery and supplies of all kinds, own and use the major portion of the building. It is also the new home of the Paraffine Paint Company, W. L. Rhoades, Northwestern manager.

Two freight elevators in the rear and one passenger elevator conveniently located in the front furnish quick transportation to the upper floors.

The Fobes Supply Company are now comfortably installed in their new building and in position to maintain their established reputation for good servce.

WESTINGHOUSE STEAM ENGINES.

While there have been important power extensions in turbine equipment, the steam engine business of the Westinghouse Machine Company has been fairly active. Some of the contracts recorded in the last few months are as follows: Byron Jackson Iron Works, San Francisco, Cal., three compound engines for centrifugal pump drive. Kentucky State Hospital, Frankfort, Ky., three compound engines for central light, heat and power plant. Central Islip Hospital, Central Islip, L. I., two engines, and The Johns Hopkins Hospital, Baltimore, Md., three engines, both for isolated plants. Chicago, Minneapolis & St. Paul R. R., one engine for railroad shop plant. T. A. Gillespie Company, contractors, one engine for construction work. Black Hills Traction Company, Deadwood, S. D., one engine for railway power plant.

PACIFIC ELECTRIC HEATING COMPANY AT CHICAGO ELECTRIC SHOW.

The exhibit of the Pacific Electric Heating Company of Ontario, California, at the Electrical Show held in Chicago during the past week was in charge of Mr. H. F. Holland, manager of the Chicago branch. The principal feature of the exhibit was the new automatic cutout iron. This iron is an entirely new departure of anything heretofore produced in the way of electrically heated sad irons. This automatic cutout attachment is a mechanical device, and is in no way operated or influenced by a thermostat. It is built into the iron and so constructed if the iron is left in circuit without being used, whenever the iron reaches a point above the working temperature, a spring is released which throws the iron switch plug entirely off of the iron, and this plug may not again be inserted until the temperature has lowered enough to set the mechanism, when the spring will again engage, and this operation will be indefinitely repeated, thus entirely eliminating any possibility of the iron causing a fire, as it is impossible for the current to reach the iron without the spring being reset and the iron plug again attached.

Besides these automatic cutout irons, there was a large exhibit of their standard famous Hot Point iron. The most distinctive feature of this iron is the fact that two heating elements are used and are placed in the iron in such a manner as to deliver a sufficient amount of heat directly into the front of the iron to maintain a working temperature at the point when the iron is in actual service. It will be readily seen that the demand for heat in the point of any laundry iron is so much greater than the demand upon any other part of the working surface, that it is necessary, in order to maintain an even working temperature all over the face of the iron, to deliver considerably more heat to the point than to the balance of the iron. To the above well known construction a number of new features are included in the 1909 model, among which are the following:

Heretofore, the heating elements in this iron have been held in place by riveting the metal in the corners of the iron over the heater core projections extending into the corners. Hereafter the same contact will be maintained with the corners of the iron, but the elements will be held in place by

a clamp which will take the place of riveting, and make the operation of removing or renewing the heating elements a very simple one indeed. The switch plug will be enclosed in a very strong, sheet steel case so that breakage from any sort of abuse will be well nigh impossible. The popular stand attached to the heel of the iron will be built in box form so as to fully enclose and protect the terminals at the rear of the iron.

Fires are caused only after electric irons have reached a temperature of from 900 to 1500 degrees Fahrenheit, so that with this automatic iron, there is a wide margin of safety. This automatic feature also protects the heating elements from being overheated and injured thereby. It also overcomes any waste of current due to allowing the iron to remain in circuit when it is not in actual service.

There was also a display of large pressing and tailor irons in which the heat may be adjusted to three distinct temperatures. This is the only iron on the market whereby the current consumption is absolutely reduced in proportion to the three degrees of heat required. Several of these automatic cutout irons and the three tailor irons have been in constant operation, under most severe conditions, during the past six months, and have proven entirely satisfactory in every respect.

El Tosto received a prominent place, as this toaster was the first to come on the market and the constantly increasing sales would indicate it is the most popular, and by its simple construction and being built with an open coil, it does not rise to a high enough temperature to cause oxidization, is consequently free from burnouts and has thus won for itself the confidence of all who have purchased same.

The electric curling tong heater is also by a class for itself in as much as it requires no cord but is screwed into any electric light socket and the curling tongs, of any size, are held in place by a spring and heat very quickly, with less than one ampere of current.

The company showed a full line of other devices, such as air heaters, foot warmers, chafing dishes, percolators, etc. To meet the demands of the Eastern trade, they have recently established a complete factory in Chicago where all of these devices are manufactured.

ELECTRICITY IN A PAPER MILL.

An important contract for electrical machinery has just been closed by the Oxford Paper Company, of Rumford, Falls, Me., with the Western Electric Company. The machinery purchased includes five motor-generator sets consisting of 5-500 h. p., 2,300 volt induction motors, driving 330 K. W., 230 volt, direct current generators, with motor driven exciters and a thirteen panel switchboard. Power is to be taken from the line of the Rumford Falls Power Company, which is increasing its plant for that purpose. Everything is of the most modern type and designed to include the latest improvements in apparatus of its class.

This electrical machinery is to be used in a large, new plant which the Oxford Paper Company is now building at its Rumford Falls mills to manufacture for its own use, bleach liquor and caustic soda by a new electrolytic process invented by Jasper Whiting, of Boston, and developed under his direction during the past three years to a point where it is said to have obtained a high degree of efficiency. The Whiting process, unlike those previously used for manufacturing the above chemicals, employs mercury as an agent and produces only chemically pure materials. It is said to be exceptionally economical as regards the use of power and to require only a minimum amount of labor in its operation. A very great saving in the cost of manufacture of pulp and paper is expected to result from the installation of this plant.

FUSES AND FUSES.

The D. & W. Fuse Co., the first in the field, began marketing an enclosed fuse in 1896. The quick recognition which was accorded this cartridge fuse was good evidence of its engineering value and this judgment has since been amply sustained in practice, while the action of the National Board of Fire Underwriters, in recommending the approval of none but enclosed fuses, places the official seal of approbation upon an ingenious and important invention.

Enclosed fuses of different makes have of necessity many external features in common, and in the new National Electrical Code Standard fuses, all superficial dimensions for each

range are fixed by the code and must be adhered to by the various makers, so it is to the internal construction that we must look for the distinguishing characteristics of the successful fuse.

In the design of the link, which is the vital portion of the fuse anatomy, there are several important objects to be attained. It must be accurate in rating and certain to blow on the specified overload, without getting too hot. On short circuit it must open immediately without flash or undue noise, and show no tendency to hold an arc. It must not deteriorate from continued use at its rated load, nor be seriously affected by external variations in temperature.

These necessary features are ingeniously secured in the D. & W. fuses by the use of their original patented interior construction, which completely satisfies the requirements of the most severe service. The smaller fuses are constructed with the air drum, a patented device, which enables the overload blowing time of the fuse to be predetermined with a high

degree of accuracy. By its means the time element of the fuse can be carefully adjusted to suit the service for which the fuse is to be used and this is most important in the protection of air governors, controllers, heating and lighting circuits.

In the larger D. & W. fuses are used the patented multiple-strip and cylinder links, which, exposing as they do the maximum surface for radiation to the filling, enable the volume of metal to be reduced nearly 40% below that of the ordinary strip links. This decrease in the amount of metal is of the greatest importance in determining the behavior of the fuse on severe short circuit as fuses of this design operate with a mere hiss where non-tubular links explode with violence.

During their investigations they subjected fuses of this construction to the most severe tests which have probably ever been inmposed on any enclosed fuses, they being blown on direct short circuit between the third rail and the structure of the Interborough Rapid Transit Company's system with enormous generator capacity feeding the line. Under these conditions, the "D. & W." was the only fuse from the designs submitted by the various manufacturers, which successfully withstood the test. Other features of design in the D. & W. fuses are worked out with equally successful results, while the details of manufacture have been constantly perfected during thirteen years of actual experience, so it is with pardonable pride that the present line is offered to the trade by this company.

PRODUCER GAS POWER EXTENSIONS.

Cia Azucarera del Panuco, Tampico, Mexico, has placed an order with the Westinghouse Machine Company for a complete producer gas-electric power plant. This initial installation will consist of a vertical, 3-cylinder, single-acting engine and a 150 h. p. suction producer, designed to operate on small anthracite coal. The use of the suction producer in such large sizes has proven thoroughly practicable, and considerable business is anticipated along this line. Even larger sizes of producers of the suction type are contemplated by the builders. The New York Standard Watch Company, of Jersey City, N. J., also operate a suction producer gas plant of considerable size, and recently added another unit to their plant. A number of contracts have been let for gas engines operating temporarily on natural, or illuminating gas, with the intention of later changing over to producer-gas operation. A 200 h. p. plant has been ordered by Seaver & Company, Chelsea, Mass., and by the Cambridge Gas Company, Cambridge, Md. The Shelbourne Falls, Mass., Electric Light Company have adopted the power gas system and have ordered a 175 h. p. Westinghouse suction producer for anthracite coal.

EXHIBIT OF THE CUTLER-HAMMER MANUFACTURING COMPANY CHICAGO ELECTRICAL SHOW.

The exhibit of the Cutler-Hammer Manufacturing Company, of Milwaukee, is devoted entirely to their line of push-button switches and sockets. None of their numerous lines of motor starters and speed regulators are shown in their own booth, but these devices are in evidence in other exhibits, being shown in connection with the exhibits of motor manufacturers and motor operated machinery.

At the entrance to the Cutler-Hammer booth is a large working model of their push-button switch enclosed in plate glass so that the operation of the simple, three-piece mechanism can be plainly seen. On pushing the mammoth push-button a row of incandescent lamps flash their rays onto a sign at the back of the booth.

Numerous lamps and electroliers installed in the booth serve to illustrate the practical applications of Cutler-Hammer push-button specialties.

Push-button porcelain lamp sockets are shown in connection with tungsten lamps, the operation of the push-button lighting the lamp wthout tilting it or jarring the delicate filament.

A two-circuit pendent switch is shown in connection with an 18-lamp electrolier, one button controlling six lamps and the other twelve, thus making it possible to obtain by means of a single switch three degrees of illumination—six, twelve or eighteen lamps, the full candlepower of the electrolier being obtained by pressing both buttons. This same two-circuit switch is also shown in connection with an electric fan and lamp, each being separately controlled by different buttons of the same pendent switch.

Several new devices are also shown, among these being a flush switch which will be shortly placed on the market. This switch has the same simple mechanism as the other devices, the elimination of a multiplicity of parts enabling the manufacturers to meet the modern demand for a really shallow flush switch. Electric candelabra equipped with tiny push- button switches are also exhibited and a number of photographs and colored drawings illustrating various applications of Cutler-Hammer push-button specialties add to the attractiveness of this booth.

Representatives in attendance were: R. M. Van Vleet, R. I. Phillips, Horace L. Dawson, Chas. J. Klein, H. P. Jones.

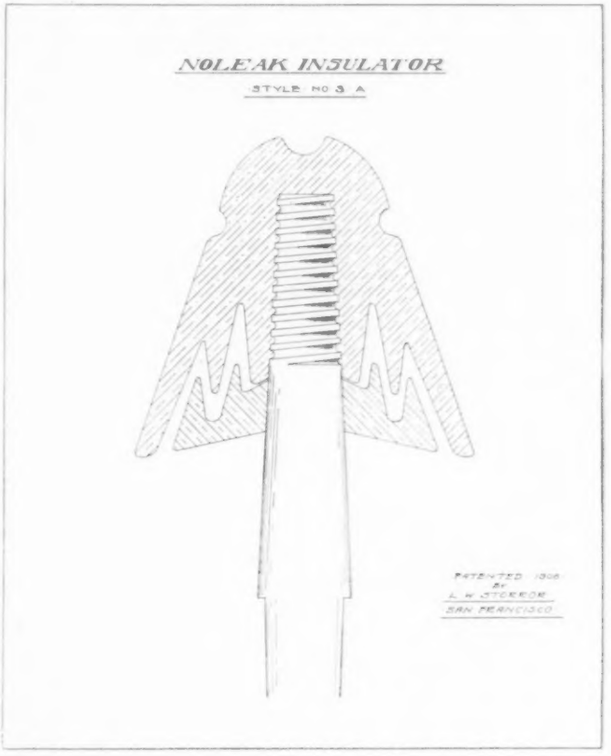
TURBINE BUSINESS.

The Westinghouse Machine Company reports good progress during recent months in the steam turbine business despite the general depression existing in the machinery market. While business has been considerably below normal, there have been many encouraging features in all directions of power application. Out of the most important business covering some twenty machines ranging in size up to 10,000 horse power, we find the usual activity in electrical, power and traction work, and a fair demand from various industries, including phosphate, cement and rubber mills, steel car works and oil refineries. Inquiry for exhaust steam turbines is active, and several equipments have been contracted for. The most important orders are as follows: Metropolitan Street Railway, Kansas City, 15,000 k. w.; Narragansett Electric Light Co., Providence, R. I., 7,000 k. w.; Capitol Traction Co., Washington, D. C., 3,000 k. w.; B. F. Goodrich, Akron, Ohio, 1,500 k. w.; Tampa, Florida, Electric Co., 1,500 k. w.; Colorado Springs Electric Co., 1,000 k. w.; Pressed Steel Car Co., McKees Rocks, Pa., 2,000 k. w.

In addition to the above, there are equipments of 1,000 k. w. and under for the Portland Cement Co., Denver; Coronet Phosphate Co., Plant City, Florida; Bronx Gas and Electric Co., Westchester, N. Y.; Black Hills Traction Co., Deadwood, S. D.; Jacksonville Oil Mill Co., Jacksonville, Ala.; Fall Mountain Electric Light and Power Co., Bellows Falls Electric Co., Bellows Falls, Vt.; Tide Water Oil Co., Bayonne, N. J.; City of Loganport, Ind., and Bristol (Tenn.) Gas and Electric Co.

THE NOLEAK INSULATOR.

A new form of insulator, intended to eliminate the leakage and cross-fire troubles on electric wires, is illustrated herewith. As shown in the picture it consists of two parts separated by an area of still air, thus maintaining at all times a clean and dry space between the tie wire and pin. Floating particles of dust, carbon or moisture do not enter beyond the first arm of the zig-zag separation. This insures



good insulation, particularly in a wet country. It is stated to obviate all troubles usually occurring with fog. This insinsulation is the invention of Mr. Leonard W. Stonor, of San Francisco, whose practical experience with the Postal Telegraph Co. showed him its necessity. It is to be manufactured by the Brookfield Glass Co., of New York City.

NEWS NOTES

ILLUMINATION.

PASADENA, CAL.—The City Council has rejected the offer of the Edison Electric Company to sell its plant for $250,000, and has begun preparations to call a bond election for $150,000, to be devoted to the extension and maintenance of the municipal lighting plant.

ROSWELL, N. M.—At a recent mass meeting of the citizens of Roswell, the advisability of the city owning its own electric light plant was discussed and it was decided that a petition will be presented to the City Council, asking for a bond issue in the sum of $18,000.

FRESNO, CAL.—Manager Wishon of the Fresno Light and Power Company states that preparations are being made by the company to develop its system for the distribution of power to the towns of Clovis, Sanger and Lemoore.

OROVILLE, CAL.—Continued heavy rains caused the new dam of the Oro Light and Power Company at Philbrook Valley to burst last week, releasing a flood of ninety million cubic feet of water.

EUREKA, CAL.—As a result of the very high water in Eel river the town of Ferndale in Northern California has been without light for a number of days. The storm caused the fall of the heavy cables of the North Mountain Power Company, entailing a loss of several thousand dollars.

HEALDSBURG, CAL.—Sealed bids will be received to February 1st by the Board of Trustees to build an addition to the power house at Gird ranch.

MADERA, CAL.—W. H. Parker, who, with C. E. Trink, wishes to erect and maintain a gas plant in this city, announces that 225 of the necessary 300 applicants for gas have been received. The plant is expected to be in operation early next summer.

MESA, ARIZONA.—The South Side Gas Company has been granted a franchise to erect and operate a gas plant in this place.

ST. HELENA, CAL.—Henry Brown has been granted an electric lighting franchise for a term of fifty years.

OGDEN, UTAH.—Word has been received by Secretary Reynolds of the Weber Club to the effect that Henry L. Lee, the engineer who recently investigated the outlook for a gas plant in this city, has reported very favorably to the New York Company which holds the franchise for a new gas system in Ogden.

LOS ANGELES, CAL.—Rumors are prevalent to the effect that the electric light, power and gas interests of Southern California are to amalgamate, it having been stated late last week that only a few minor details in the plan remain to be worked out. It is stated that the financial formulas in the premises are already written, with the Edison Electric Company and the Huntington-Kerckhoff interests each equally affected, the Los Angeles Gas & Electric Company to have about half the interest of the two former concerns. Such an amalgamation, if consummated, will mean a holding company with a capital of about $50,000,000.

ST. HELENA, CAL.—Henry Brown has been granted a franchise to erect poles, wires and appliances for the distribution of electric power for light, heat and power to the town of St. Helena.

TRANSPORTATION.

FRESNO, CAL.—It is expected that the survey of the proposed electric line between Fresno and Hanford will be begun within a week and that work of construction will be begun by February 1st. A large supply station is being erected in Fresno where the supplies for the road are to be stored as they arrive from the East.

NAPA, CAL.—M. C. Gintean of Los Angeles, has been chosen as traffic manager of the San Francisco, Vallejo and Napa Valley Electric road, to succeed L. J. Perry, who resigned on the first of this month. The new manager is already in charge.

RENO, NEVADA.—The fact that the Reno Interurban Company has removed its cars and that the Nevada Transit Company is now running on the interurban tracks has given renewed life to the report that the transit company has bought the interests of the interurban system. Various reports are made by officials of both companies in denial of any deal of this nature.

SAN JOSE, CAL.—The San Jose Traction Company has applied to the City Council for a franchise for the construction of a street railroad. The application has been taken under consideration by the Council.

BERKELEY, CAL.—This city will have electric cars running on the tracks of the Southern Pacific Company, according to Assistant General Manager Scott, who has charge of the conversion of the company's steam roads to electric. Where the road requires double tracks through the Berkeley streets the streets will be widened four feet in order to gain more roadway.

PASADENA, CAL.—Horace M. Dobbins states that construction on the new line between this city and Los Angeles will begin next summer.

LOS ANGELES, CAL.—As a result of the transfer of title of the old Cycleway right-of-way between Pasadena and Los Angeles, which was made to the Pasadena Rapid Transit Company, a rumor is getting about that the air-line between the two cities is allied with the Los Angeles Pacific Railway Company.

STOCKTON, CAL.—Morris L. Brackett has secured rights of way from Modesto to Riverbank for the San Joaquin Valley Electric Railway Company. He has obtained similar concessions for this road from Stockton to Modesto. Work on the road from Stockton to Modesto will commence immediately.

WILMINGTON, CAL.—The Pacific Electric Railroad Company has begun work on its line between Wilmington and San Pedro. The franchise was granted two years ago and the company has but two months in which to complete the line.

SANTA BARBARA, CAL.—The Santa Barbara Consolidated Railroad Company has been granted a franchise for a street railway along Bath street.

SACRAMENTO, CAL.—The Board of Trustees is ready to grant franchises to the Northern Electric and Central Traction roads to construct their lines through this city to the water front. The franchises are being prepared.

SALT LAKE CITY, UTAH.—President Simon Bamberger of the Salt Lake & Ogden Railroad has gone East to close the contracts for the installing of electric power on that road between this city and Ogden.

FRESNO, CAL.—Ground will be broken for the Fresno Hanford Interurban Railway by February 1st, and the road will probably be in operation by July 1st. The road is to be constructed at a cost of $1,000,000.

LOS ANGELES, CAL.—H. F. Vollmer has petitioned the City Council to offer for sale a twenty-one-year franchise for an electric street railway line on Fifty-fourth Street, the line to be an extension of the Hoover Street line.

LOS ANGELES, CAL.—Sealed bids will be received by the Supervisors up to January 18th for the sale of an electric street railway franchise for a line along Washington Street.

SALT LAKE CITY, UTAH.—Plans for the installment of electric equipment on the Salt Lake and Los Angeles Railroad will be considered by the directors on January 12th, the meeting to be held in this city. According to estimates the cost of equipping the road with electricity would be near $300,000. Should the improvement be undertaken it is said the work would be completed by July of this year.

OAKLAND, CAL.—New mechanical equipment has been installed on all controlling cars of the Key Route trains, making it impossible for a sleeping or dead motorman to operate the train. With the new automatic apparatus, the motorman must constantly keep his finger pressing the button that controls the brakes of the train. When the pressure is relieved the air brakes become set.

CHIHUAHUA, MEX.—The local electric street car company began the putting out of rails and materials this week to be used in the extension of its road out the Avenida Zarco.

GOLDFIELD, NEV.—Active work was commenced this week upon the construction of an electric line to connect Goldfield with Columbia and Diamondfield.

LOS ANGELES, CAL.—A company has been formed and a line between this city and Pasadena will be built. It is to be an elevated line, with steel coaches and with the third-rail electrical equipment.

RENO, NEV.—S. M. Wheeler and Charles Burke will begin work on the construction of a street railway line from the Southern Pacific depot into the southeastern end of the city.

FINANCIAL.

RED BLUFF, CAL.—In the suit of W. H. Gurnsey to restrain the Northern California Power Company from maintaining a power line along a public highway over his lands, Judge Ellison has rendered a decision in favor of the plaintiff.

SAN FRANCISCO, CAL.—An official of the Northern California Power Company states that the annual showing will amount to about $30,000 net earnings, of which $10,000 will go into dividends and $20,000 to surplus. The company expects to double its output by July 1st.

REDLANDS, CAL.—A report of the Home Gas & Electric Company shows a gain of 78,000 k. w. of electricity during December, 1908, over the same month in 1907, the electric business of 1908 almost trebling that of 1907. The gain was made largely on power. With the numerous contracts for pumping to be filled this year the capacity of the plant will be taxed. The increase in gas output for 1908 was 2,000,000 over the previous year.

MODESTO, CAL.—A bond election is to be held in this city and among other improvements to be considered will be the issuance of bonds in the sum of $15,000 for the extension of the water mains.

SAN FRANCISCO, CAL.—For the month of October, 1908, the gross earnings of the United Railroads of San Francisco amounted to $609,042, an increase of $177,460 as compared with October, 1907. The gross earnings for the ten months ending October 31st amounted to $5,677,343, an increase of $1,865,246 over those of the corresponding period in 1907. The net earnings for October increased $141,450 over October of 1907.

MADERA, CAL.—An election will be held on January 7th, to vote on the proposition of issuing bonds in the amount of $25,000, $18,000 to be used in the purchase of a sewer system, and $7,000 for the acquisition of necessary extensions to the system, and $50,000 for the construction of a municipal waterworks.

PASADENA, CAL.—Plans for the completion of the municipal lighting plant calling for a bond election of $150,000, have been presented to the City Council by C. W. Koiner. The plans also call for the purchase of the overhead distributing system of the Edison Electric Company, the competitor of the municipal plant.

INCORPORATIONS.

LOS ANGELES, CAL.—The Hamilton Oil & Gas Co., with a capital stock of $100,000, has been incorporated here.

SAN LUIS OBISPO, CAL.—The North Alamo Oil Company has been incorporated here with a capital stock of $200,000. The directors are C. A. Adams, Thomas Preisker, W. C. Oakley, C. L. Preisker, and C. W. Smith.

HANFORD, CAL.—The Carrie Nation Oil Company has been incorporated in this city with a capital stock of $25,000, by L. H. Byron, J. H. Freer, A. J. Whitesides, A. B. Buckner, and F. P. McAdam.

LOS ANGELES, CAL.—The Standard Gas and Electric Fixture Company has been incorporated here with a capital stock of $25,000 by L. C. Cook, E. B. Armstrong and C. E. Montgomery.

BAKERSFIELD, CAL.—The North McKittrick Oil Company has been incorporated in this city with a capital stock of $500,000. The directors are, J. T. Jacobson, E. J. Sullivan, F. Hall, E. H. White and W. B. Beaizley.

BAKERSFIELD, CAL.—The Kern Midway Water Company has been incorporated by J. H. Sheridan, J. M. Dunn, F. M. Worthington, S. V. West and T. M. Young.

HANFORD, CAL.—The Uno Oil Company with a capital stock of $25,000, has been incorporated here by W. C. Reilly, R. L. Peeler, E. A. Webb, A. E. Webb and E. W. Robinson.

FRESNO, CAL.—The Nevada Petroleum Company has been incorporated here with a capital stock of $1,000,000 by M. L. Requa, F. W. Bradley, J. S. Wallace, A. C. H. Fletcher and C. A. Norris.

PRESCOTT, ARIZONA.—The Yacapai Water Company has been incorporated with a capital stock of $50,000. The incorporators are W. J. Mulvenon, M. B. Hazeltine and Thomas C. Job.

BAKERSFIELD, CAL.—The Bed Rock Oil Company has been incorporated in this city with a capital stock of $50,000 by B. T. Dyer, Mrs. Mable H. Dyer, O. G. Myers, Mrs. M. P. Myers and W. L. Leland.

BAKERSFIELD, CAL.—The Arica Oil Company has incorporated here, capital stock of $500,000, by G. Sheridan, W. A. Sloan, R. T. Fisher, L. E. Westrich, L. E. Westrich and W. E. Buck.

PASADENA, CAL.—The Pasadena Rapid Transit Company has been organized in Pasadena with a capital stock of $3,000,000, by G. H. Hayes, W. H. Smith, E. J. Sheehan, D. C. Porter and Mr. Dobbins.

SANTA ANA, CAL.—The Coyote Hills Oil Company has been incorporated with a capital stock of $900,000, by C. V. Hall, John Sharp and others.

SAN FRANCISCO, CAL.—The Templor McKittrick Oil Company has been incorporated in this city with a capital stock of $3,000,000, by J. H. Hollywood, F. A. Anderson, W. N. Howes, N. F. Nelson and J. W. Jordan.

LOS ANGELES, CAL.—The Gas Operating and Construction Co. has been incorporated with a capital stock of $10,000, by G. R. Moffet, J. W. Nottingham and C. S. S. Forney.

LOS ANGELES, CAL.—The Tidewater Crude Oil Company, with a capital stock of $3,000,000, has been incorporated by W. E. Donaghoe, L. O'Neal, R. H. Burton, W. O. Emerson, W. M. Hiatt, B. K. O'Neal and F. L. Emerson.

LOS ANGELES, CAL.—The La Costa Oil Company has been incorporated in this city with a capital stock of $1,000,000, by R. A. Blair, G. E. Banks and J. W. Whitham.

TRANSMISSION.

PHOENIX, ARIZONA.—Engineer L. C. Hill states that 26,0000 h. p. can be relied upon in the Salt River reclamation project. A total of nine plants will be constructed to supply this amount and will constitute a chain between Roosevelt and Phoenix. Plants 1, 5 and 9 will comprise the initial supply of power.

YREKA, CAL.—By extending its line from Montague to Dunsmuir the Siskiyou Electric Light and Power Company will be enabled to furnish power and light to five more towns in Northern California. Work has already commenced and the company expects to finish the extension by June 1st. The mines of the Klamath river section will be supplied with power through seven miles of the new line. Gazelle, Edgewood, Weed, Sisson and Shasta Springs will be served through the new extension.

SONORA, CAL.—N. Spaulding has appropriated 5,000 inches of water to be used in the generation of electrical power for general purposes.

SANDPOINT, IDA.—The Pend d'Oreille Electric Company, the controlling interest in which is owned by Jerome L. Drumheller of Spokane, is to be bought by a group of Chicago capitalists who have become interested with Mr. Drumheller in the development of the power sites on the Moyea River.

PORTLAND, ORE.—A. B. Crosman, tenth floor Board of Trade Building, is one of the Portland Water Power & Electric Transmission Company, recently incorporated. He states that the purpose of the company is to appropriate the waters of the Clackamas River for the purpose of generating power and electric power. Twenty-five thousand horsepower will be developed. Machinery for the above has not been contracted for as yet. W. H. Hurlburt, Board of Trade, is the active head of the company.

OIL.

SAN FRANCISCO, CAL.—The Supreme Court has reversed the decision of the lower court in favor of the plaintiff in the case of the Graciosa Oil Company against the County of Santa Barbara. The action was brought to recover taxes assessed to the oil company, and which had been paid under protest.

BAKERSFIELD, CAL.—The Mount Diablo Oil Company has commissioned J. W. Brisco to sell its property for a million dollars in round figures. Although no sale has been made, it is reported that negotiations are pending.

BAKERSFIELD, CAL.—The Alladdin Oil Company has executed a lease of its land to E. W. Preston of Fresno County, for a term of 20 years. The lease provides for the drilling of at least five wells to a depth of not less than 2,950 feet and reserves a quarter royalty to the lessor, drilling to begin within thirty days.

LOS ANGELES, CAL.—Two Companies have been formed in this city to operate on concessions of Indian lands near Lender, Wyoming. One concern is headed by M. M. Gilchrist, the other being under the management of George Mitchell.

LOS ANGELES, CAL.—The Union Oil Company's annual meeting will be held on the third Thursday of January at Oleum. Many important matters will be taken up at this meeting.

RIVERSIDE, CAL.—The Elsinore Oil and Gas Company will purchase a standard drilling deep well rig with a capacity of 4,000 feet.

SAN FRANCISCO, CAL.—S. W. Wible, an oil operator of Bakersfield, was in this city for a number of days last week.

BILLINGS, MONT.—William Fitzhugh and F. D. Shields, of California, will erect a refinery to treat the oil from the Garland oil fields. It is estimated that $1,000,000 will be spent in erecting and equipping the plant.

BAKERSFIELD, CAL.—The Dayton Oil Company's property in the Midway field has been leased to a party of San Francisco oil men, the principal lesses being S. L. and F. L. Lezinsky. The lease is for twenty years and one-sixth royalty basis.

SAN FRANCISCO, CAL.—The Standard Oil Company is importing foreign oil products into California at the rate of 2,000,000 gallons a month. The Standard exported over $2,000,000 worth of refined petroleum products from San Francisco during the fiscal year 1907 to 1908.

BAKERSFIELD, CAL.—The Union Oil Company has closed negotioations for the property of the Sunset Road Oil Company in Sunset and Midway fields.

RHYOLITE, NEV.—Prof. T. W. Green, representing an Eastern syndicate, has purchased 640 acres of oil land from Al McCausland and his associates. According to reports from this field, many indications of the presence of oil are to be found, including fossil rock, paraffine, clay, asphaltum and shale. For fifteen miles along the railroad between Rhyolite and Las Vegas the ground has been located, and machinery has been ordered by the company represented by

PHOENIX, ARIZ.—The Potomac Oil Company, operating at Bakersfield, Cal., has re-organized and at a recent meeting here the following directors were elected: B. M. Lovell of Los Angeles, Lafayette E. Pike and Joseph P. Tuttle of Hartford, Conn., Edwin H. Clark of Litchfield, Conn., and John H. Osgood of Bakersfield.

SANTA BARBARA, CAL.—The California Liquid Asphalt Company, whose refinery has been operating at Summerland for eight years, will abandon the local field and move its plant to San Luis Obispo County.

LOS ANGELES, CAL.—The Union Oil Company has purchased 740 acres in the Sherman section of Los Angeles field. Through the acquisition of this property the Union Company will assume control of the Consolidated Oil Corporation.

WATERWORKS.

OAKLAND, CAL.—In a decision handed down by Judge Waste last week it was intimated that the Spring Valley Water Company will be restrained from taking artesian water from Pleasanton Valley and delivering it to the consumers of San Francisco. The decision was given in suits brought by Pleasanton Valley ranchers, who claim that the wells sunk by the Spring Valley Company have caused their artesian wells to go dry and in that way ruining their crops.

LOS ANGELES, CAL.Sealed bids will be received by the Board of Public Works up to January 15th for furnishing the city with steel for tunnel forms.

LOS ANGELES, CAL.—Sealed bids will be received by the the office of the City Clerk up to January 19th for furnishing galvanized pipe and fittings for the park department of the city.

SACRAMENTO, CAL.—Bids for 8,400 feet of 6-inch cast-iron pipe will be received at the office of the City Clerk up to January 25th.

SAUSALITO, CAL.—Forty-year bonds in the sum of $100,000 for the installation of a municipal fresh water system have been ordered issued by the Trustees. The Trustees have decided to bring suit against the Sausalito Spring Water Company for the forfeiture of its plant on the ground that the company has violated its charter by selling water to outside consumers, while residents of the city have been on a short allowance.

SAN FRANCISCO, CAL.—The Supervisors have authorized the Public Works Commission to enter into a contract for the purchase of pipe, fire hydrants, gate valves and other appurtenances of the proposed auxiliary fire protection water system. The sum to be expended has been limited to $1,850,000.